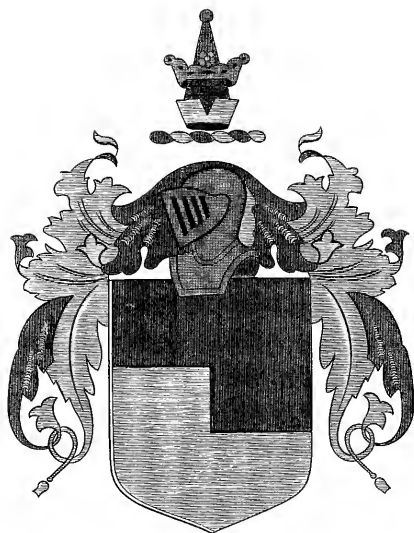




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THE
LECTURES
OF
SIR ASTLEY COOPER, BART. F. R. S.
SURGEON TO THE KING, &c. &c.
ON THE
PRINCIPLES AND PRACTICE
OF
Surgery;

WITH
ADDITIONAL NOTES AND CASES,

BY
FREDERICK TYRRELL, ESQ.
SURGEON TO ST. THOMAS'S HOSPITAL, AND TO THE LONDON
OPHTHALMIC INFIRMARY.

—
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ERRATA.

Page 2, line 28, *for lamina, read laminæ.*

Page 64, line 24 and 25, *for the seat of stricture, read the stricture.*

Page 86, line 15, *for psoas, iliacus internus, read pectineus, adductor longus.*

Page 118, line 15, *for round, read wound.*

Page 134, line 22, *for muscles, read muscle.*

Page 161, line 8, *for head, read hand.*

Page 163, line 6, *for ulcerated, read ulcerative.*

Page 302, line 30, *for can, read cannot.*

Page 317, line 30, *for scapulæ, read scapula.*

Page 325, line 13, *for crepitus, read crepitus.*

Page 399, line 20, *for facture, read fracture.*

Page 470, line 1, *for Bayer, read Boyer.*

Page 474, line 12 and 26, *for maleolus, read malleolus.*

Page 475, line 3, ditto ditto.

LECTURES,

&c.



LECTURE XXXI.

ON HERNIA.

THIS, of all the diseases to which the human body is liable, demands, upon the part of the surgeon, a large share of anatomical knowledge, great promptitude and decision, and the utmost skill and dexterity in the performance of an operation, when it is rendered necessary, by a defeat of the means employed for its reduction. In other important cases, consultations may be held, or the patient be sent to a distance to obtain the advantage of the best opinions; but in hernia the fate of the patient is decided almost upon the instant, and an hour's delay may turn the scale of success against the surgeon, and destroy the prospect of safety on the part of the patient.

Importance of the subject.

Definition. A hernia is a protrusion of any viscus from its proper cavity; but the term is principally applied to the protrusions of the abdominal viscera, to which it is at present my intention to confine my description.

Abdomen particularly liable to such protrusions.

The abdomen is particularly liable to such protrusions, on account of the moveable state of its viscera, of the natural openings from it to give passage to blood vessels, and unnatural apertures from deficiency of structure, and from the great changes in bulk to which the omentum and mesentery are subject; so that instead of being surprised at the frequency of its occurrence, it might be expected, from a knowledge of anatomy, that it would occur in many more instances than it does.

Kinds of hernia.

There are several genera of abdominal herniæ; four of which, however, are more frequent than the others; viz. the inguinal, the femoral, the umbilical, and the ventral; but beside these, there is a hernia through the ischiatic notch, one through the foramen ovale, a pudendal, a perineal, a vaginal, occasionally a protrusion takes place through the diaphragm, the kidneys have been found in a swelling in the loins, and the small intestines have been seen between the lamina of the mesentery and mesocolon; but, to the two latter, the term hernia is scarcely strictly applicable.

Of Inguinal Hernia.

Of this hernia, there are four different species:— Of inguinal hernia.

1. The oblique taking the course of the spermatic cord. Species.

2. The direct descending from the abdomen immediately through the external abdominal ring.

3. The congenital, or a protrusion into the tunica vaginalis.

4. The encysted hernia, composed of a bag and protrusion suspended in the tunica vaginalis.

Before any hernia is formed, unless in wounds, laceration, or deficiency of structure, a bag of peritoneum precedes the protruded viscera, and forms a sac in which they are contained, and which is usually called the hernial sac. This protrusion is somewhat thicker than the natural peritoneal lining of the abdomen, the pressure of the viscera leading to an interstitial deposition into the membrane; it is not placed loosely in the parts into which it is protruded, but it adheres by cellular tissue to all the surrounding structures. Contained in a sac.

Of the Oblique Inguinal Hernia.

Synonyms.

This is also called bubonocoele when seated in the inguinal canal; and, when it further descends, is named scrotal; as it takes the course of the spermatic cord, it might well be denominated spermatocele.

Before I describe the course and dissection of this hernia, it is necessary that I should say something on the structure of the inguinal canal, and of the course of the spermatic cord.

Structure of the inguinal canal.

The spermatic cord first quits the abdomen mid-way between the anterior superior spinous process of the ilium and the symphysis pubis; it here passes between two layers of the fascia transversalis, the anterior layer of which is fixed in Poupart's ligament, whilst the posterior layer descends behind Poupart's ligament, and assists in covering the femoral artery and vein, and in forming the crural sheath; above the passage of the spermatic cord, the two planes of this fascia unite, and form a lining to the transversalis muscle, extending as far as the diaphragm. As the cord penetrates between these two planes, which form the internal ring, a thin layer of fascia unites it to the edge of each.

No part of importance is situated between

the anterior superior spinous process of the ilium, and the point at which the spermatic cord passes through the fascia transversalis; but between the latter place and the pubes, the epigastric artery takes its course. This artery is situated from one-fourth to one-half an inch upon the inner side of the internal abdominal ring, or passage of the spermatic cord, from the abdomen, and it passes to the inner part of the rectus muscle. The external iliac artery and vein are directly behind this internal abdominal aperture, and this opening is the beginning of the inguinal canal, in which the spermatic cord is next continued.

Epigastric artery.

The inguinal canal is bounded anteriorly by a superficial fascia from the abdominal muscles, and by the tendon of the external oblique; posteriorly, by the fascia transversalis, and by the tendon of the transversalis muscle; above, by the edges of the internal oblique and transversalis muscles, and below by Poupart's ligament; the canal is about two inches in length, and terminates at the external abdominal ring.

Boundaries of the inguinal canal.

The external abdominal ring is formed by two columns of the tendon of the external oblique muscle united by fibres from Poupart's ligament; the upper column is inserted into the symphysis pubis, the lower

External ring.

column into the tuberosity of the pubes, the pubes bounds the opening below; between these columns the spermatic cord passes; and from the edge of the ring, as well as from the surface of the tendon of the external oblique muscle, a thin fascia descends, uniting the cord to the edges of the opening, and passing down upon it to the tunica vaginalis; this fascia is then situated between the skin and the cremaster muscle; which muscle arises within the inguinal canal from the internal oblique muscle; it descends with the spermatic cord, and passes through the external abdominal ring; spreading over the fore and lateral parts of the cord as far as the tunica vaginalis into which it is inserted.

Spermatic
cord.

Behind the fascia and cremaster muscle the spermatic cord is found passing to the testis; it is covered by the tunica vaginalis, and is composed of the spermatic artery and vein, absorbents, and nerves, with the vas deferens and an artery accompanying it.

Origin and
course of
the hernia.

The oblique inguinal hernia first enters the upper opening of the inguinal canal, or internal abdominal ring, so that at its commencement it is placed just mid-way between the anterior superior spinous process of the ilium and the symphysis pubis, and close above Poupart's ligament; it has the

spermatic cord behind it, and the epigastric artery to its inner side: when in the inguinal canal it is about two inches in length, and is covered anteriorly by the superficial fascia of the external oblique muscle and by the tendon of that muscle, the inferior edges of the internal oblique and transversalis muscles form an arch over it; the cremaster muscle covers it partially; it has a thin slender covering from the edge of the internal ring; the fascia transversalis, strengthened by the tendon of the transversalis, is situated behind it, and to its inner side; and Poupart's ligament is placed below it.

Having descended through the inguinal canal, it next emerges at the external abdominal ring, and it is then usually denominated scrotal hernia.

Appears at the external ring.

Its increase being then much less restrained than before, it descends on the fore part of the spermatic cord to the testicle, at the upper part of which it usually terminates.

Increases more rapidly.

Upon dissecting this hernia below the external ring, there is found covering it;—first, the fascia of the spermatic cord, derived from the external oblique tendon and the edge of the abdominal ring; this substance is dense, and forms a strong covering, which has often been mistaken for the hernial sac;

Dissection of the hernia.

when this has been divided, the cremaster muscle becomes exposed, covering the fore and lateral parts of the hernial sac. The cremaster muscle is thicker than the fascia of the cord, and its muscular texture is easily distinguished in the living body. On cutting through this muscle, and a dense cellular tissue, the hernial sac is laid bare, united on the fore part to the cremaster muscle, and on the posterior part to the spermatic cord, resting below upon the tunica vaginalis of the testicle.

Usual contents of the sac.

The usual contents of the hernia are either intestine or omentum; if the former, it is called enterocele; if the latter, it is denominated omental, or epiplocele. In the young, omental hernia is rarely met with, it being generally intestinal, for this obvious reason, that the omentum in the young subject covers only the superior abdominal viscera.

Varieties of Oblique Inguinal Hernia.

Varies in size.

From the description which I have given of this hernia, it is clear that it may vary in length, from the upper ring to the testicle, and consequently that it is sometimes seen occupying only the inguinal canal.

Sometimes very large.

In some cases the hernia is so large as

nearly to reach the knee, but in general it does not exceed two fingers' breadth, and barely reaches to the upper part of the testicle; its bulk depends considerably upon the time which it has existed, upon the degree of relaxation of the patient, and upon his inattention to the disease.

I have seen the pylorus descend to the mouth of the hernial sac. The urinary bladder is also occasionally situated within it;* and we have an excellent specimen in the collection at Guy's Hospital, of an inguinal hernia in the female, where the ovarium and falopian tube are protruded into the hernial sac.†

Unusual
protru-
sions.

The spermatic cord is usually situated behind the hernial sac; but in one of the preparations in the Museum at St. Thomas's Hospital, the cord is divided, the vas deferens passing upon one side, and the spermatic artery and vein upon the opposite side. I have seen also the spermatic artery and vein passing over the fore part of the sac, while the vas deferens passed behind it.

Usual
situation
of the sper-
matic cord.

* When the cæcum or urinary bladder are protruded, there is not a complete peritoneal sac; but it is deficient at that part of either viscus not naturally covered by it.

† See hernia in the female.

Symptoms of Inguinal Hernia.

Distinction
from other
diseases.

It is discriminated from other diseases by the following marks :—it gradually descends from the abdomen in the course of the spermatic cord : it usually protrudes in the erect, and retires when the patient is in the recumbent posture : it dilates upon coughing, and upon all exertions of the abdominal muscles : flatus may be often felt in it when it is intestinal, and it retires with a gurgling noise : when omental it has a doughy feel, is much less elastic than the intestinal hernia, and retires into the abdomen more slowly ; the intestinal is accompanied with costiveness, and with pain across the abdomen ; the omental rarely produces any disturbance of the abdominal functions, when in the reducible state ; the hernia of the bladder is distinguished by the diminution of the swelling during the evacuation of the urine.

The following are the principal marks of distinction from the diseases with which it is most likely to be confounded.

From hydrocele.

From hydrocele, by that disease beginning below, and gradually ascending, by its transparency, by its fluctuation, its pyriform shape, its involving the testicle, and by the want of dilatation from coughing ; however, there

is an exception to this, if the hydrocele enters the upper part of the scrotum, when it sometimes dilates upon coughing, and the only means of distinction are in its history, its transparency, and its fluctuation.

From hydrocele of the spermatic cord, it is with great difficulty distinguished, unless the hydrocele emerges from the external ring, when its transparency indicates its true nature.

From hydrocele of the cord.

Hydrocele and hernia are sometimes combined in the same individual, of which there is a beautiful specimen in the collection at St. Thomas's Hospital; a case of this kind occurred to Mr. Thomas Blizard, on which he operated, and a similar one to Mr. Henry Cline; in each case the water was in the first instance discharged, and then the hernial sac became exposed behind the tunica vaginalis.

Hernia & hydrocele sometimes combined.

Hydrocele is also connected with hernia, when there is water in the abdomen; and I have tapped a hernial sac in ascites for the discharge of the accumulated water, and it is the best mode of operating in such a case, when it is quite certain that neither the omentum or intestine are descended, and that you can decide by the transparency.

Hernia is known from hæmatocle, by the latter being usually the result of a blow, and by the ecchymosis which at first accompanies

From hæmatocle.

it, by its not extending to the inguinal canal, by its not dilating upon coughing, by the bowels being undisturbed, and by its not returning into the abdomen.

From diseased testicle.

Hernia is little liable to be confounded with disease of the testicle, the history of the swelling, its form, the distinctness of the spermatic cord, the want of intestinal obstruction, the absence of dilatation on coughing, and its not returning into the abdomen, are sufficient marks of the latter disease.

Hernial sac connected to the spermatic cord.

I have seen, however, diseased testicle complicated with hernia, and have twice been under the necessity of dissecting the hernial sac from the spermatic cord, during the extirpation of the diseased testicles. In one case I opened the sac unintentionally in the operation, but it did not prevent the patient from doing well.

Acute inflammation of the testicle, mistaken for hernia.

The acute inflammation of the testicle is the only state which I have known confounded with hernia; the tenderness of the part, the swelling extending up the cord, and the vomiting accompanying the disease, led to a doubt which could only be removed by a knowledge of the history and progress of the complaint.

From varicocele.

The disease with which hernia is most frequently confounded is varicocele, or enlargement of the spermatic veins; this is a

very common complaint, it occurs most frequently upon the left side, and is supposed to be founded in the termination of the left spermatic vein, at right angles with the emulgent. It sometimes dilates upon coughing; it appears in the erect, and retires in the recumbent position. It is distinguished from hernia by its feel, (which resembles that of a bag of large worms,) by its being unattended with intestinal obstructions, by placing the patient in the recumbent posture, and emptying the swelling into the abdomen; then pressing the finger upon the external ring to prevent any visceral descent, by which the free return of blood by the spermatic vein is obstructed, and the swelling re-appears when no hernia could escape.

I have more than once known a truss applied for this disease, and in one instance to the son of a medical man, by his father.

Truss applied for varicocele.

Inguinal hernia occurs more frequently upon the right side than the left, probably because the greatest exertions are made of the right side, from the preference we give to the use of the right arm, two-thirds of inguinal hernia are upon the right side.

This hernia most frequent on the right side.

Causes of Hernia.

The loose connections of the jejunum,

Loose connection of viscera.

ilium, colon, and omentum, give a proneness to the disease. The other viscera are rarely found in hernia.

Natural
apertures.

The natural apertures for the passage of the blood vessels also lead to the ready production of hernia.

Malforma-
tions.

Malformations also give rise to hernia, as when the abdominal ring is unnaturally large. Some species of hernia are originating entirely from malformation, as the phrenic and ventral.

Increase of
omentum
or mesen-
tery.

Great increase of the omentum or mesentery in obesity leads to hernia. Pregnancy produces it. Violent exercise frequently occasions it, by forcing the viscera through the apertures. Great exertions of the abdominal muscles in lifting weights, more especially in the stooping posture, is a common cause of this disease, as also coughing or straining violently. Flatulent food, and food difficult of digestion, tends to produce hernia. Great wasting of the body, by leaving the abdominal apertures relaxed, is also a cause.

Thus, then, the parietes give rise to hernia, by their formation, malformation, and contraction; and the viscera by their pressure, and from the changes they undergo, especially in old age.

Climate.

The lax state of fibre, induced by a long residence in warm climates, may also be

mentioned as pre-disposing to the formation of hernia.

Of the Reducible Hernia.

A hernia is said to be reducible when it can be returned into the cavity of the abdomen.

In order to put the patient into a state of Treatment. safety, and to prevent a future descent, a truss is to be applied. A truss is required for the smallest hernia, as the danger from this disease, is in an inverse ratio to the size of the tumor.

Salmon and Ody's truss is most easily Salmon & Ody's truss. worn, and most appropriate for recent and small hernia; but the objection to it is, that it cannot be worn during the night, and therefore the patient requires one of a different kind in bed. They are, however, excellent trusses.

Egg's truss, and those of the common kind, Egg's truss. are worn day and night, and make a steady pressure on the part.

Hernia, very difficult to support, are best Pindin's truss. prevented protruding by Pindin's truss, which has no springs; I have seen it succeed when no other answered the purpose.

To obtain a truss, it is only necessary to send the measure of the pelvis to the instru-

ment maker. The principle upon which the pad of the truss is to press, is the whole length of the inguinal canal; that is, to reach from the upper to the lower ring.

Effect of a
truss,

Will this cure me? the patient inquires: Yes, if he be young, assuredly; if old, I have known it do so in a few instances. How long must I wear it? to which the answer is, A year after the hernia does not appear when the truss is removed for a few hours, the patient at the time taking his usual exercise. Am I to wear it at night as well as by day? Yes, or you have little chance of being cured; and there is otherwise danger of strangulation.

In consequence of wearing a truss, the sac falls into folds, and gradually contracts; but more particularly at its orifice. If hernia be complicated with hydrocele from the abdomen, both diseases are cured by wearing a truss.

Danger of
leaving off
the truss.

Giving up the use of a truss before the cure is complete, is very dangerous; as from the contraction and thickening of the mouth of the sac, there is more liability to strangulation. The shut sac of a hernia will sometimes produce hydrocele by the secretion from its inner surface.

LECTURE XXXII.

IRREDUCIBLE HERNIA.

It is so called when it is uninflamed, but does not return into the cavity of the abdomen; and it acquires this state from the following causes:—

1st. Growth of the protruded omentum or mesentery, rendering it too large to return through the orifice of the hernial sac. Causes.

2nd. Adhesion of the omentum, mesentery, or intestine, to the inner surface of the sac.

3rd. Membranous bands formed across the sac by adhesion.

4th. Omentum intangling the intestine.

5th. A protruded cœcum, in which the intestine adheres by cellular membrane behind, and the sac exists only on the fore part.

6th. A portion of omentum suddenly protruded, of too large a size to be immediately returned.

Danger of Irreducible Hernia.

If intestine be protruded, it is sometimes ruptured from a blow upon the tumor. Rupture of intestine.

Liability
of strangulation.

There is a constant liability of strangulation from any slight additional protrusion.

Formation
of abscess.

I have known an abscess form in the protruded omentum, and prove destructive.

Treatment of Irreducible Hernia.

To give
support.

Nothing can be done in some of these cases, but to give support to the part by the application of a laced bag truss. When it arises from obesity, attention to diet, and to the means of reducing the patient, may sometimes succeed, for I saw a gentleman who became reduced from dropsy in his chest, and had a hernia return, which had been for a long period irreducible.

Use of Ice.

Apparently in irreducible omental hernia of recent formation, I have known the application of ice succeed when there was not any inflammation proceeding, as far as could be ascertained by the pain.

Case.

A physician who had an omental hernia irreducible for a fortnight, had ice applied to it through the medium of a bladder, for four days, during which period it gradually returned. In another case the same treatment was successful; and it appeared to me that the ice was serviceable, by occasioning a constant contraction of the skin, and supporting moderate pressure on the part.

Of the Strangulated Oblique Inguinal Hernia.

When the parts protruded into the hernial sac cannot be returned into the abdomen, and the pressure is so great as to prevent the free circulation of blood through the vessels of the protruded viscera, the hernia is said to be strangulated, and the following symptoms are usually present.

Definition.

The patient directly feels violent pain in the region of the stomach, as if a cord were bound tightly round his body; and this is followed by frequent eructations which continue until the strangulation be removed;—there is a great desire for a fœcal discharge; but the person only passes a small quantity of fœces from the large intestines. The tumor feels hard, and if it be intestine which has descended, it is often extremely tender to the touch. Vomiting soon occurs; first the patient throws up the contents of the stomach, afterwards bile, which is regurgitated from the duodenum; and if it be a portion of the large intestine which is strangulated, fœcal matter is sometimes discharged from the stomach, as the symptoms become more urgent. The pulse is at first hard, and rather quicker than natural.

Symptoms.

On the next visit to the patient, the vomiting is more urgent, the costiveness remains,

More urgent symptoms.

the abdomen is tense from flatulence, the tumor is harder and more tender, the pulse is more frequent, smaller, but still hard.

Peritoneal
inflammation.

Strangulation still continuing, the abdomen becomes extremely tender to the touch, on account of the peritoneum becoming inflamed, at the same time the pulse is very small, thready, and frequent: in addition to the other symptoms, hiccough occurs, the vomiting and costiveness continue, the tumor becomes more tense, often is inflamed upon its surface, and now and then the marks of the fingers, when pressed upon it, remain.

Last stage.

In the last stage, the pulse frequently intermits, the patient is covered with a cold perspiration, but his mind appears less depressed, and as his pain is less, he has more expectation of recovery.

Explanation
of
symptoms.

With respect to these symptoms, the pain in the abdomen, and the vomiting, are at first sympathetic; and the discharge of bile and fœculent matter afterwards is kept up by the anti-peristaltic motion, which takes place above that portion of intestine contained in the hernia; perhaps the valve of the colon may in some instances be imperfect, by which the vomiting of fœculent matter may be accounted for; the obstruction to the passage of the fœces by the usual course, is prevented

by the strangulation of the intestine; the tension of the abdomen arises at first from accumulation of flatus, and subsequently from peritoneal inflammation, which also occasions the tenderness of the abdomen; the hiccough has been considered as an indication of gangrene; but I have known operations performed in many cases, after its appearance, and the patients have done well, the contents of the hernial sac not being found in a gangrenous state; the tension of the tumor is caused at first by accumulation of blood from obstructed circulation in the part; afterwards it increases from effusion into the hernial sac, in part of serum, and part of fibrin.

It sometimes happens just previous to the patient's death, that he has evacuation from his bowels, and this probably takes place from the tension of the affected parts being lessened by the approach of dissolution.*

Evacuations
just before
death.

* I have introduced the following case as presenting some unusual peculiarity respecting the evacuation from the bowels, during the continuance of the symptoms of strangulation.

Thomas Davis, a porter, aged fifty-nine, (who had for two years been subject to hernia,) on Saturday, the 12th of March, 1825, after making some unusual exertions, found that the swelling formed by the hernia had much increased in size, and resisted his repeated attempts to reduce it. On Sunday morning, the 13th, he experienced pain in the tumor, and in the abdomen,

Variation
in the
symptoms.

The symptoms of strangulation do not always continue equally severe; but for

which was soon followed by vomiting. In the evening, as he did not get better, he applied to a surgeon in his neighbourhood, who for some time tried the taxis, but ineffectually; in consequence of which he was taken to St. Thomas's Hospital. On examination, a femoral hernia was discovered on the right side, about the size of an egg, hard, and tender to touch. He was bled, and placed in the warm bath, and when he appeared faint, the taxis was again employed, under which the hernia became apparently lessened, but not completely dispersed. As he was not perfectly certain of its being quite reducible before the existing symptoms, I was induced to order an enema; and directed, in case of a free discharge from the bowels after its use, that some purgative medicine should be given by the mouth. He had a copious motion from the enema, and in consequence some pills of cathartic extract and calomel, were given, after which, during the night, he had three more abundant motions. On the following morning, (the 14th,) however, I found that the tumor had regained its former magnitude and tension; that it was very tender, as also was the abdomen, and that he had hiccough, with occasional vomiting. Under these circumstances, after a further short trial of the taxis, and which made no impression upon the swelling, I performed the operation. The hernial sac was surrounded with enlarged glands; it contained a little fluid, and a portion of intestine, which was highly inflamed and perfectly incarcerated. This was liberated and replaced in the cavity of the abdomen without much difficulty, and the wound was dressed as usual.

In consequence of much tenderness of the abdomen,

short intervals the patient is often nearly free from suffering, and then again the symptoms become violent.

Dissection of the Hernia.

If gangrene has not taken place, a small quantity of serum is found under the skin, and in the hernial sac a coffee coloured effusion of the same nature; this is usually more

Before the
commence-
ment of
gangrene.

on pressure, in the evening, I ordered, Hirud. xxiv. abdom. Fot. Papaveris, et Tinct. Opii gutt. xxv.

15th. Less pain and tenderness of the abdomen. He had slept comfortably, (pulse 80, and feeble,) but he was troubled with occasional sickness; the hiccough had subsided: ordered, Mist: Efferv: pro re nata. \overline{c} Tinct: Opii gutt v. Sin. dos, if the sickness continued. At two o'clock he was seized with dyspnæa and more frequent vomiting, but had no increase of tenderness. Ordered enema commun. \overline{c} Oleo Ricini, and to continue the mixture. The enema was repeated in the afternoon, but did not produce any evacuation, and late in the evening he died.

On examining the body after death, I found the peritoneum much inflamed, and exhibiting marks of previous disease, there being old and firm adhesions. The portion of intestine which had been strangulated consisted of a complete fold of the ilium, including the whole diameter of the gut; it had still the mark from the stricture upon it, and was much more discoloured than any other part.—T.

abundant when intestine has descended, than when omentum alone is protruded. The intestine is of a dark chocolate brown, and has its surface covered by a coat of adhesive matter, by which it is in part glued to the hernial sac, but not very firmly. Directly under the seat of stricture, the intestine has suffered particularly, and often gives way to very slight pressure of the fingers. If omentum has protruded, it is found red, and somewhat harder than natural.

When gangrene has occurred.

When gangrene has taken place, the skin over the tumor is emphysematous, and retains any marks made by the pressure of the fingers. When the sac is opened, a highly offensive smell is emitted, and if intestine be protruded, it is of a deep port wine colour, and has on its surface numerous greenish spots, and its texture is so altered, that its surface loses its brilliancy, and it gives way to very slight pressure. Omentum, when gangrenous, is of a dark colour, easily breaks, and feels somewhat like a portion of lung, crackling under the pressure of the fingers.

Appearances in the abdomen.

On opening the cavity of the abdomen, the peritoneum is found inflamed, red lines can be traced on the intestines, where they are lying in contact, and here adhesions are formed from effusion of fibrin. The intestines are immensely distended with flatus.

If omentum alone has descended, the symptoms are usually much less severe, and the patients live longer than when the hernia is intestinal.

Symptoms less severe from omental hernia.

Seat of Stricture.

In old and large hernia, the seat of stricture is at the external abdominal ring, but in by far the greater number of cases, the stricture is seated at the orifice of the hernia from the abdomen, at the internal ring, and here it is occasioned by the semi-circular edge of the tendon of the transversalis becoming thickened, as well as that portion of the hernial sac pressed on by this tendon.

External ring.

Most frequent at the internal ring.

I have also seen the stricture mid-way between the two rings, and it appeared in these cases to be occasioned by a thickening of the sac, which, by the exertions of the patient, had been frequently forced down to the external ring, and had again retired into the inguinal canal.

In the inguinal canal.

There is also a beautiful specimen in the collection at St. Thomas's Hospital, showing a stricture formed by a strong membranous band within a hernial sac; the patient, from whom it was taken, had been operated on by one of the surgeons of that Hospital; and

Stricture from membranous band.

although the inguinal canal had been freely opened, yet the surgeon could not return the intestine without doubling it back, which he did, and brought the integument together over it by sutures. On the day following the operation, the intestine peeped out between the sutures, and was in a gangrenous state, and the case terminated fatally.

Omentum
entangling
intestine.

Another occasion of stricture is from omentum entangling the intestines, an excellent example of which I operated upon in the case of a patient of Mr. Richard Pugh, of Gracechurch Street.

Cause of
strangulation.

The cause of strangulation is generally a sudden protrusion of an additional portion of intestine or omentum. The eating of vegetable food so as to produce flatulence, or very indigestible animal matter, is a frequent cause.

Danger in
small
hernia.

A small hernia is much more easily strangulated than a larger one.

Of the Treatment of Strangulated, Oblique, Inguinal Hernia.

Danger of
strangulation.

As the danger is entirely consequent on the pressure of the stricture upon the protruded viscus, the great object of the surgeon is to return the protruded part into the abdomen, as quickly as he can with safety.

The operation for effecting this reduction is called the taxis, and it is performed in the following manner:—The patient is placed in a recumbent posture, with his head and shoulders a little elevated, and his thighs at right angles with his body. His bladder should be previously emptied. The surgeon, standing on the right side of the patient, passes his right hand down between the thighs, to grasp the swelling, and with his left thumb and fingers he kneads the hernia at the upper part of the inguinal canal. Slight pressure and elevation of the scrotum, with a kneading of the upper part of the hernia, are used for the purpose of returning a small portion of the protruded parts, when the whole usually follows without difficulty. The pressure should be continued a quarter of an hour, at least, for I have known it succeed after a trial of twenty minutes. The object is to use a continued steady pressure, and not violent means; which, in several instances which have come under my observation, have caused a rupture of the intestine, so that, in the operation, as soon as the sac has been opened, fœculent matter has escaped. If the strangulation has been long continued, the employment of force becomes doubly dangerous.

Taxis, and
mode of
employing
it.

The intestinal hernia is more easily reduced than the omental, it returns more suddenly,

Intestinal
hernia
most easily
reduced.

and with a gurgling noise, but sometimes the tenderness of the part is such as to forbid the immediate employment of the taxis.

Case.

I attended a young man, with Mr. Croft, in the city, who, from tenderness, could not bear the swelling to be touched. I ordered ice to be applied, and in seven hours the hernia returned without the aid of the taxis.*

Bleeding,
advantage
of.

If the taxis does not succeed, bleeding from the arm should directly be had recourse to. In all cases it is best to employ it, on two accounts. First.—By the faintness which it produces, it frequently becomes the means of assisting the return of the hernia. Second.—If the hernia be not reduced, it saves the patient from the danger of peritoneal inflammation, which an operation is likely to produce. I never saw it do harm; and have in many cases witnessed its extreme efficacy. In

* In the month of May last, I was requested to see a publican in the Borough, who was suffering from the strangulation of a ventral hernia, about the size of an orange, seated in the linea alba, between the ensiform cartilage and umbilicus. The tumor was so extremely tender, that he could not bear me to make the slightest pressure upon it. I directed ice to be applied, which was kept on for three hours; after this period I succeeded easily in reducing the hernia, which had been strangulated nearly two days.—T.

strong athletic persons it should be carried to a very great extent ; in the old and infirm, little need be taken away.

From neglect in bleeding, the patient very often dies, four or five days after the operation, from peritoneal inflammation. The object is to produce a fainting state, otherwise the bleeding does very little good.

Consequence of not bleeding.

Persons are very often deceived in peritoneal inflammation, on account of the small thready pulse with which it is accompanied ; but this, instead of being a bar to the abstraction of blood, only indicates a greater necessity for it. I shall have occasion to mention the great benefit derived from it, in a case in which hiccough was extremely violent.

Pulse deceptive.

The next object which the surgeon has in view, when bleeding and the taxis fail, is to put the patient in the warm bath, which is of no use unless it occasion faintness ; and since I wrote my work on hernia, I have had several opportunities of witnessing its efficacy in assisting the reduction. If there is not immediate convenience for its use, no time should be lost in procuring it, as there are other and more powerful remedies.

Warm bath.

The most powerful agent in the treatment of strangulated hernia, is the tobacco glyster ; for if when the patient is under the influence of this remedy, the hernia cannot be returned

Tobacco glyster.

by the taxis, there is but little chance of any mode short of an operation succeeding. The manner of making it is to infuse one drachm of tobacco in one pint of water, and of this one half should be first thrown up, and according to the effect produced in twenty minutes, or half an hour, the other half may be injected, or not. This is the safest plan of administering the tobacco, it produces extreme languor and relaxation of all the fibrous structures, and is certainly the most potent remedy which is employed, but at the same time requires the utmost caution in its use.

Fatal effects of tobacco.
Case.

I have seen a patient with strangulated hernia expire under the effects of tobacco, which had been used in the quantity of two drachms, without reduction of the hernia; he was placed upon the operating table, but as his pulse could scarcely be felt, his countenance showed extreme depression, and as he was covered with a cold sweat, the operation was not performed, and the patient died, as the assistants were removing him.

Case.

A girl who was sent to Guy's Hospital, by Mr. Turnbull, surgeon, had a single drachm of the tobacco in infusion injected, to assist the reduction of a strangulated hernia. She soon after its being administered complained of violent pain in the abdomen, and vomited. The hernia was reduced, but she died in

thirty-five minutes after the use of the tobacco, and evidently from its effects.

Mr. Wheeler, senior, of St. Bartholomew's Hospital, told me he had known it destroy life, but prudently employed it in the way that I have recommended; it is the most efficacious of the remedies proposed for the reduction of hernia.

The effect to be wished for from the use of tobacco, is a universal relaxation, so that the patient has not power to exert any of the voluntary muscles; when this is produced, a hernia may be sometimes reduced with very little force, after having previously resisted a firm and continued pressure. Under the influence of tobacco, hernia, which has before its employment felt tense, will become soft, and this is not occasioned by any partial reduction of the hernia, but only by the force of circulation being for a time greatly diminished.

Beneficial
effects of
tobacco.

I have several times known the application Cold. of cold succeed in reducing a hernia, and it has this great advantage;—that it arrests the progress of the symptoms, even when it does not ultimately succeed; therefore, when an operation cannot be immediately performed, it should always be employed. Ice broken into small pieces and put into a bladder; or water cooled by adding equal parts of

muriate of ammonia, and nitrate of potash to it, are the most convenient modes of producing the desired effect. I have known the cold produced by the evaporation of spirits of wine and water, succeed in reducing a hernia.

Caution in
applying
ice.

It is very improper to apply ice in such a manner that the patient or his bed clothes become wet as the ice melts; it is also wrong to continue it upon the part for a long time together, as it may occasion sloughing, as occurs from the effects of frost bite. A case in which sloughing was produced in this way, was attended by Mr. Sharp, and Mr. Cline, who had directed the application of ice over a strangulated hernia, and continued it for thirty-six hours. The part, to the extent of four inches, froze, became hard and white; the hernia was reduced, but soon after the removal of the ice, the part thawed, becoming red and inflamed; in about ten days it assumed a livid hue, and sloughed to the extent that it had been frozen.

Purgatives.

Purgatives used formerly to be very much given, but are now little employed. Calomel given by the mouth, and a strong enema of the compound extract of colocynth, sometimes are useful.

Fomentations—

If the parts be exquisitely tender, fomentations may be employed, which if long

continued, may by their relaxing effects answer the same purpose as the cold.

Of Direct Inguinal Hernia.

Sometimes a hernia protrudes nearer to the pubes than that I have just described, descending from the abdomen immediately behind the external abdominal ring, and having the epigastric artery situated on its outer side.

Mr. Cline first observed this species of hernia, in opening the body of a Chelsea pensioner, with Mr. Adair Hawkins, on the 6th of May, 1777. The hernia was on the right side, and the mouth of the hernial sac was situated an inch and a half on the inner side of the epigastric artery. I have myself witnessed several cases of this description.

First observed by
Mr. Cline.

I have carefully dissected this hernia, and found that it passed on the inner side of the epigastric artery, and protruded through the external abdominal ring, under the fascia of the cord, pushing the spermatic cord to the outer and upper part of the tumor. I traced a covering upon it, formed in part by the tendon of the transversalis muscle, and in part by the fascia transversalis; beneath which is situated the hernial sac. The coverings of this hernia are, therefore, the integument,

Course of.

the fascia of the cord, a part of the cremaster crossing obliquely the outer part of the swelling, then the fascia and tendon of the transversalis.

Differs
from the
oblique
hernia.

It differs from the oblique inguinal hernia in not taking the course of the inguinal canal, but in protruding directly through the external ring, and having the epigastric artery to its outer side, and in having but an imperfect covering from the cremaster, and a perfect one from the fascia transversalis and tendon of the transversalis united.

Distin-
guishing
marks.

The distinguishing marks between the direct and oblique inguinal hernia, are the situation of the spermatic cord, and the direction of the tumor; in the first, the spermatic cord is on the outer and upper part of the swelling, and the swelling may be traced in a direction towards the umbilicus:—in the latter, the spermatic cord is situated behind the hernia, and the inclination of the tumor is towards the spine of the ilium.

Causes.

The direct inguinal hernia may be produced suddenly from a laceration of the tendon of the transversalis, in which case the covering from this tendon will be found wanting.

Case.

A gentleman applied to me, having a direct inguinal hernia, which had appeared immediately after he had been thrown from his

horse, and had fallen with the lower part of the abdomen upon a post, by which accident I imagine the tendon of the transversalis might have been ruptured.

I have never seen this hernia acquire the size of the common inguinal hernia, and in most of the cases I have witnessed, the patients have had some disease of the urethra.

Seldom becomes large.

In a patient of Mr. Weston's, of Shoreditch, who had for a long time laboured under difficulty in passing his urine, I found six hernia of this description, of which I have given a plate. I also found several strictures in his urethra, and a stone lodged behind one of them.

Case in which six hernia existed.

Treatment of Direct Inguinal Hernia.

When reducible, the truss employed should be longer than that applied for common inguinal hernia, as the part at which the hernia quits the abdomen, is an inch and a half nearer to the pubes. The pad of the truss should not rest on the pubes, but press principally a little above the abdominal ring, otherwise the general form of the truss may be the same.

Truss.

If the hernia be irreducible, the means

When irreducible.

recommended for the oblique irreducible hernia will be proper.

When
strangula-
ted, taxis.

When strangulated, the reduction must be attempted in a different direction to that required for the oblique. The tumor is to be grasped as in the oblique hernia, with one hand, while the fingers and thumb of the other hand are to be placed over the abdominal ring, to knead the neck of the swelling, and the pressure must be directed upwards and inwards, instead of upwards and outwards.

Case.

In this manner I quickly succeeded in reducing a direct hernia which had become strangulated, in a patient who was admitted into Guy's Hospital, for some other complaints. The hernia was small, it had the cord to its outer side, and could not be traced higher than the abdominal ring.

Hernia
apparently
reduced.

This hernia may apparently be reduced by the employment of the taxis, and strangulation still exist; a case of this kind occurred a short time ago at Guy's Hospital. A man applied at the surgery, having a direct hernia strangulated, and the taxis was had recourse to, by which the gentleman in attendance thought he had succeeded in reducing the hernia, as he had pushed it through the abdominal ring. The symptoms of strangulation, however, still continued, and in two or three days the man died. On examination of

his body, the hernia was found placed immediately behind the external ring, with a stricture still existing at the mouth of the sac.

Operation for Strangulated Inguinal Hernia.

When the means I have recommended have been tried, without enabling the surgeon to reduce the hernia, or relieve the strangulation, it becomes necessary that an operation should be performed, to liberate the strangulated viscus. When necessary.

There is but little danger attending this operation, if the person upon whom it is to be performed be free from other disease. The cause of persons who have undergone this operation, so frequently dying, is not to be attributed to the operation, but to the degree of mischief which has taken place previously to its being performed. But little danger.

When strangulation has existed for a long time, the contents of the hernia either become gangrenous, or in a state so nearly approaching to it, that they do not recover their proper functions, otherwise inflammation extends from the strictured portion to the viscera, within the cavity of the abdomen, and thus the surgeon has to combat with a Gangrene.

severe disease after the removal of the strangulation. The danger is therefore in the delay, and not in the operation.

Danger of
delay.

Very frequently much time is unnecessarily lost, before an operation is proposed; and too much cannot be said in condemnation of such practice. A patient is submitted again and again to the taxis, and the swelling is rendered extremely tender, by being so often compressed, in the hope of avoiding an operation, until at length the rapid increase and urgency of the symptoms point out the impropriety of such delay; and an operation is performed when but little prospect of success remains.

It is extremely important that the operation should, if possible, be performed before the abdomen becomes tender under pressure. Distension of the intestines from flatus, often produces tension of the abdomen, soon after strangulation has occurred; but still the patient can bear pressure without experiencing pain; but when he does complain of pain under pressure, it indicates the extension of inflammation to the cavity of the abdomen, which is likely to be much increased by the operation.

Progress
of inflam-
mation
varies.

The progress of inflammation, and extent of mischief, are not always in proportion to the time that strangulation has existed, for the period between the commencement of

the symptoms, and the fatal termination, varies exceedingly.

A large hernia when completely strangulated, is more quickly fatal than a smaller one; but the latter more frequently requires the performance of an operation, on account of the greater firmness of the stricture.

Small herniæ more frequently require operation.

A hernia containing a portion of strangulated intestine alone, is more rapidly fatal than one containing omentum only; and that containing both intestine and omentum, takes a middle course between the two above mentioned.

Intestinal hernia most dangerous.

When a hernia has existed for a long time, and becomes strangulated, the attempts at reduction will be more likely to succeed than if it were of recent formation; in the first instance, the parts are more easily relaxed, having been accustomed to repeated dilatation; while in the latter case, the powers of resistance are much greater.

Old herniæ most likely to be reduced.

Also in very young, or very old persons, strangulated herniæ are more frequently reduced, than when they occur at the middle period of life, during which the fibrous structure is firmer, and the muscular strength greater than at any other period. In very old persons, also, the strangulation is not so rapidly fatal; as long a period as twenty days have been known to elapse between

Also in very old or young persons.

the commencement of the symptoms, and the death of the patient.

Of the Operation for Inguinal Hernia.

Bladder to
be empti-
ed, and
parts
cleansed.

Previous to the operation, the patient should be directed to empty his bladder, and the integument upon the tumor and surrounding parts, must be cleansed from the hair usually covering it.

Position
of the pa-
tient.

The patient is then to be placed upon a table, about three feet six inches in height, on his back, the shoulders should be raised, and the thighs a little flexed towards the body, so as to relax the abdominal muscles; the hams are to be brought to the edge of the table, so that the legs may be allowed to hang over it.

Operation.

The surgeon should now place himself between the patient's thighs, and grasp the tumor with his left hand, so as to put the integument covering it upon the stretch, and then having a scalpel in his right hand, he should commence the operation by making an incision through the skin, on the anterior part of the swelling, which incision should be begun opposite the upper part of the external abdominal ring, and carried down to the inferior part of the tumor, unless the swelling be of a large size. Besides the skin and

cellular substance, the external pudendal artery may be divided by this incision, as it always crosses the sac near the abdominal ring. The hæmorrhage from this vessel may usually be stopped by pressure; but if very troublesome, it will be necessary to put a ligature upon it.

By this incision the fascia of the cord becomes exposed, which generally forms the thickest covering of the hernia. This must be carefully cut through in the centre, so as to admit the entry of a director which is to be passed under the fascia, upwards to the ring, and downwards to the extent of the external incision, that the fascia may be safely divided upon it.

Fascia of
the cord
exposed.

Thus the cremaster muscle is brought into view, forming the next covering, which must be opened and divided in the same manner as the fascia, and with equal care, and the cellular tissue beneath must be cautiously cut through.

Cremaster
exposed.

When this has been completed, the hernial sac itself is laid bare, and the surgeon must proceed with the utmost caution to open it in the following manner. He first nips up a small portion of the membrane on the anterior and inferior part of the tumor, between his fore-finger and thumb of the left hand, and slightly rolling the membrane between them, he easily distinguishes if any intestine or

Hernial
sac expos-
ed.

omentum be included ; and if so, he raises a fresh portion. Being satisfied that he has only a part of the sac raised, he is to place the edge of the knife horizontally against it, and make an opening of sufficient size to admit the end of a director, which is then to be introduced, that the sac may be opened upon it.

Caution in
dividing
the cover-
ings.

In dividing the different coverings, a very cautious operator will make more layers than I have described, being fearful of doing mischief which might be irreparable.

Appear-
ance of the
sac.

When the hernial sac is exposed, it has usually a bluish tint, and is semitransparent. If the contents be not adherent to the sac, it generally contains a quantity of fluid, and a sense of fluctuation may be usually perceived at the inferior and anterior part of it, for which reason this part should be first opened, as the intestine is there in the least danger.

Escape of
fluid.

Immediately the sac is opened, this fluid escapes. If the strangulation have not existed long, it is occasionally of a serous colour, but more frequently of a darker, or coffee colour, and sometimes it has an offensive smell.

Quantity
of fluid.

This fluid is most abundant in intestinal hernia, and is in quantity in proportion to the bulk of intestine strangulated. If, how-

ever, the hernia be omental, or if the intestine adhere to the interior of the sac, little or no fluid is found, so that it must not always be looked for as an indication of the sac being opened.

The sac being opened, the surgeon is enabled to see its contents, which he must attentively examine. If both intestine and omentum have been strangulated, the latter is found above and anterior to the former; in some instances covering the gut partially, in others completely.

Sac opened.

If the hernia has not been long strangulated, the omentum has much of its usual character, being only a little darker than natural, and having its veins distended; but the intestine is found covered with a thin coat of adhesive matter, and is of a red colour. When the strangulation has existed for a long time previous to the operation, or when the stricture has been unusually tight, the intestine presents a dark brown chocolate colour.

Appearance of omentum or intestine.

The surgeon should now pass his finger into the hernial sac, and examine accurately the seat of the stricture, which he will find in one of the three following situations:—

Seat of stricture ascertained.

First.—At the internal abdominal ring, in the mouth of the sac.

Second.—In the inguinal canal, an inch,

or an inch and a half within the external ring.

Third.—At the external ring.

At the internal ring.

The most frequent seat of stricture is at the internal abdominal ring, from an inch and a half to two inches above, and outwards from the external ring, and it is occasioned by the pressure of the internal oblique and transversalis muscles upon the mouth of the hernial sac, which becomes thickened, more especially on its pubic side.

How exposed.

Should the stricture be situated at this part, it has been thought necessary to divide the external ring, and to slit up in part the inguinal canal, by dividing a portion of the tendon of the external oblique muscle, in order to give the operator a distinct view of the protruded parts, and to enable him to divide the stricture without danger to his patient. This may be done by passing the finger into the sac, through the external ring, as far as the seat of stricture, and then introducing a curved bistoury with a probed extremity between the upper part of the finger and the sac, and cutting through the tendon, superficial fascia, and integument, forming the anterior boundary of the inguinal canal.

Having thus exposed the contents of the hernial sac as far as the seat of stricture, the operator should insinuate the point of his

finger, or a director, under the stricture, between the sac and its contents at the upper part, carefully keeping the latter from turning over the finger or director. He should then pass the knife for dividing the stricture upon the finger or director, under the stricture, and by a gentle motion divide the stricture in a direction parallel with that of the *linea alba*, and to an extent sufficient to allow the finger to be easily passed into the cavity of the abdomen. The knife should then be withdrawn in a careful manner. In this case I have adopted with advantage the following plan:—The sac being opened to the external ring, I have put my finger into it, and hooked down the sac; I have then directed an assistant to draw up the tendon of the external oblique at the ring, and have thus been able to bring the stricture into view without cutting the tendon of the external oblique to the upper ring.

Division of
the stric-
ture.

The knife best adapted for dividing the stricture is blunt at its extremity for about a quarter of an inch, sharp for half an inch, and then again blunt, only cutting so far as is necessary to divide the stricture, without endangering the neighbouring parts.

Knife for
dividing
the stric-
ture.

The second seat of stricture is in the inguinal canal, and is formed by the sac itself in the following way:—a person becomes the subject of oblique inguinal hernia, and

Stricture
in the in-
guinal ca-
nal.

the pressure on the neck of the hernial sac at the internal ring, creates a thickening of the sac at this part. From any sudden exertion or straining, which occasions a further protrusion, this part of the sac is forced into the inguinal canal, and when the patient is in the recumbent position, part or the whole of the contents of the sac being returned into the cavity of the abdomen, the portion of the sac which had been previously situated at the internal ring, and had been thickened, again takes its former position. This occurs again and again; but at length the sac becoming elongated, the thickened portion which had been originally placed at the internal ring, no longer returns to this situation when the contents of the sac are reduced; but it remains in the inguinal canal, and may here at any future time be the cause of strangulation.

How exposed and divided.

When the stricture is thus formed, the surgeon should freely expose the contents of the hernial sac as far as the stricture, and then divide it in the same manner, and in the same direction as before described.

Stricture of the external ring.

Sometimes, but rarely, the seat of stricture is at the external abdominal ring, in which case the same plan of dividing the stricture should be adopted; but it is not necessary to make so large an opening.

If the hernia be direct, it is to be remembered that the spermatic cord is placed on its outer side. It is covered by the fascia of the cord, by the cremaster partially, and is contained in a sac formed by the tendon of the transversalis muscle, assisted by the fascia transversalis, beside a peritoneal sac, as in other hernia.

The division of the stricture directly upwards is then applicable to every common case of strangulated inguinal hernia whether oblique or direct; it is equally safe with any other division that has been proposed, and the operation is by it more simplified than by adopting a different mode of dividing the stricture for each variety.

Best direction for dividing the stricture.

LECTURE XXXIII.

Examina-
tion of
viscera.

After having sufficiently divided the stricture, the surgeon should carefully examine the protruded intestine, particularly that part which has been immediately under the stricture, and ascertain whether the circulation becomes restored, which he may do by employing pressure to empty the vessels, and then observe if they be again immediately filled.

Should the circulation be free, he should then gradually and very carefully return the intestine by small portions at a time, until the whole is reduced. At this time the patient should be placed much in the same position as when the taxis is employed.

Adhesions.

When adhesions have taken place between the intestine and sac, great care is required in opening the latter, as little or no fluid exists in it, to separate it from the intestine, which may be in consequence easily wounded. The sac being opened, if the adhesions be found long, and not very numerous, they may be divided to allow of the return of the protruded part. Sometimes these adhesions are only found at the mouth of the

sac, or are otherwise partial; in either case they should be carefully separated, that the hernia may be completely reduced; but the division of such adhesions, particularly at the mouth of the sac, is attended with considerable danger. Sometimes the sides of the fold of intestine which has been strangulated are found glued together: in this case it is best to separate such adhesion, if it can be easily done, as the free passage of the fæces is afterwards interrupted, if the intestine be returned doubled back into the abdomen with such adhesion remaining.

Should the intestine be in a state of gangrene, it will have a fœtid smell, the peritoneal surface will have lost its brilliancy, and be of a dark port wine colour, with greenish spots on it; it will not possess any sensibility, and will easily give way under slight pressure.

Intestine
gangre-
nous.

Under these circumstances, the stricture should be divided in the manner I have described, after which a free incision should be made into the gangrenous intestine, to allow of the escape of its contents, and then it should be returned to the upper part of the sac, the wound should be left open, and a poultice applied; but if the portion of intestine which has descended be not large, it should not be disturbed from its adhesions to the sac.

Treatment
of gangre-
nous intes-
tine.

Case.

I was requested, during the absence of Mr. Chandler, to operate upon a woman who had been admitted into St. Thomas's Hospital, under his care, with strangulated hernia. From the examination of the part, and from the history of the case previous to my seeing the patient, I imagined that gangrene had commenced, and I soon found this opinion to be correct; for before I had opened the hernial sac, there was a highly offensive and putrid smell. On opening the sac, I found the intestine in the state I have before described; I therefore divided the stricture, and then made an incision of about an inch and a half in extent, on the anterior part of the gangrenous intestine, through which the fæces readily escaped. I afterwards directed that a poultice should be applied. Fæculent matter continued to be discharged through the wound; but nine days subsequent to the operation she had a stool, per anum, after which the patient passed her stools by the natural passage, occasionally at first, then more frequently, as the artificial anus and wound closed, and she completely recovered. This patient was confined five months after the operation, and delivered of a full grown but dead child, by Mr. Brown, a respectable surgeon at Rotherhithe. It is extraordinary, that being considerably advanced in her

pregnancy at the time of the operation, she did not miscarry.

When a patient with strangulated hernia will not submit to the operation necessary for his relief, or if the proper assistance cannot be procured, and gangrene takes place, the hernia sometimes suddenly returns into the cavity of the abdomen, and the patient survives only a few hours. Sometimes the skin and other coverings inflame and slough, when the fæces are discharged through the opening thus produced, and the symptoms of strangulation subside, after which an artificial anus is formed, rendering the remainder of the patient's life miserable.

Termination without an operation.

Occasionally, however, it happens that the external wound and artificial anus are gradually closed, and the patient entirely recovers.

Artificial anus.

A case of this kind occurred under the care of my friend, Mr. John Cooper, surgeon, of Wotton Underedge, Gloucestershire. He was requested to attend a poor woman, aged sixty, who was the subject of strangulated crural hernia. When he first saw her, she had been labouring under symptoms of strangulation for a fortnight, and the hernia was evidently in a state of mortification. Thinking, therefore, that there would not be any chance of saving her life by an operation, he only directed that her strength should be sup-

Case.

ported, and the part poulticed. In a few days the mortified parts began to separate, and the fæces were discharged through the wound. This continued for three months, during which period several inches of one of the small intestines sloughed. After this, a small quantity of fæces began to pass by the natural channel, and in six months the woman had perfectly recovered.

Danger of. The formation of an artificial anus is dangerous, according to its situation in the intestinal canal. If the opening be near to the stomach in the jejunum, the patient will die in consequence of the small surface for the absorption of chyle being inadequate to produce sufficient nourishment. If the opening be in the lower part of the ilium, or in the colon, then the patient may recover, as there is but little interruption to nutrition.

Case. A man about fifty years of age was admitted into Guy's Hospital, with a strangulated umbilical hernia, which sloughed, and occasioned an artificial anus. As he was recovering from the effects of the strangulation and sloughing, and was allowed to take food in any considerable quantity, it was observed that part of what solids he ate passed out at the artificial anus, within half an hour after he had swallowed them, and that fluids passed out in ten minutes after they had been taken

into the stomach. Although he took sufficient food to support a healthy person, he wasted rapidly, and died in three weeks. On examining his body after death, and tracing the jejunum, the lower part of that intestine was found entering the hernial sac, and in it the opening was situated. The other viscera were healthy.

When an artificial anus has been formed, care must be taken to guard against any inversion of the intestine at the artificial opening, as such an occurrence will most likely prevent the perfect recovery of the patient, by rendering the false opening permanent.

From inversion of the intestine.

A patient of Mr. Cowell's, in St. Thomas's Hospital, underwent the operation for a strangulated hernia; the intestine was found to be gangrenous, and the consequence was the formation of an artificial anus. For three weeks after the operation, the fæces passed in part by the artificial opening, and in part by the natural aperture, but most by the latter; at this period the intestine became inverted, and protruded at the artificial opening; after which the fæces were entirely discharged by the false passage. The man lived eleven years after this, but always discharged his stools by the artificial anus.

Case.

If a portion of the colon has been strangulated, and the patient be fat, the appen-

Appendices epiploicæ removed.

dices epiploicæ are sometimes found much more diseased than the intestine, so much so that it becomes necessary to remove them, which I have had occasion to do.

Examina-
tion of
omentum.

Having returned the intestine, the surgeon should carefully examine the omentum, and if it be not in a large quantity, or of an unhealthy appearance, it should be returned into the abdomen, with as gentle a pressure as possible. If a very large portion of omentum be protruded, a part should be removed, which may be done without any danger to the patient by means of the knife; and, if any arteries sufficiently large to afford a troublesome hæmorrhage, are divided, they must be secured by fine ligatures; the divided surface should then be returned to the mouth of the sac, so as to form a plug, and the ligatures should remain hanging from the external wound.

Use of the
ligature
abandoned.

The old mode of applying a ligature around the protruded portion of the omentum to occasion it to slough off, is now, I believe, entirely abandoned; and it appears extraordinary, that it should ever have been adopted, as it is the object of the operation to remove the stricture, which would be thus immediately restored with increased severity.

Omentum
mortified.

If the omentum be in a state of mortifica-

tion, which may generally be known by its crispy feel, and the distension of its veins by coagulated blood; or even if any suspicion arise of its being in an unsound state, it should be removed by excision at the sound part. In doing this, the strangulated portion should be drawn down a little, so as to expose some of the sound part, which should be held by an assistant to prevent its sudden retraction into the abdomen, while the surgeon cuts off the diseased part; and when this has been completed, any bleeding vessels should be secured as before directed. Should the omentum, in an unsound state, approaching to gangrene, be returned into the cavity of the abdomen, the danger of the patient will be much increased.

I have, however, known a patient recover, in whom sloughing of the omentum took place after it had been returned into the cavity of the abdomen. This occurred in a man who had undergone the operation for a strangulated hernia in Guy's Hospital. The sac contained both intestine and omentum; and the latter, although much changed in appearance, was returned into the abdomen. Some days after the operation, the man appeared to be dying; the ligatures, holding the edges of the wound together,

Sloughing
of omen-
tum.
Case.

were removed, and poultices and fomentations employed, when, on the following day, a portion of gangrenous omentum was found protruding from the wound, and for several days more continued to present itself, until the whole of the portion which had been previously strangulated was exposed, and gradually sloughed off; after which the patient recovered.

Omentum
adherent.

When the omentum alone adheres to the sac, it may be freely separated and returned, any vessels likely to afford a troublesome hæmorrhage being previously secured.

Omentum
hard like
scirrhus.

Should the protruded omentum be much hardened, or have a scirrhus feel, it should also be removed in the same manner as I have already described.

Treatment after the Operation.

Employ-
ment of
sutures.

When the contents of the hernial sac have been returned into the cavity of the abdomen, the wound should be well cleansed, and its edges should be afterwards brought into contact by means of sutures, in order to promote adhesion, two or three sutures being necessary, according to the extent of the wound. Care should be taken in passing

these sutures only to include the integument, otherwise, by penetrating the sac, much subsequent mischief may arise.

The approximation of these parts should be assisted by the application of slips of soap plaister, and a compress should be placed over the wound, and retained there by means of a T bandage, to close the orifice of the sac, and prevent any further protrusion into it, and at the same time the scrotum should be well supported. Of plaister.

The patient should then be carried to bed in a horizontal position, and placed with his shoulders a little elevated, and the thigh, on the same side as the wound, moderately flexed towards the abdomen. Position in bed.

As it is perfectly necessary that the patient should keep the recumbent position during the cure, a folded sheet must be placed under him, into which he should discharge his stools, otherwise should he rise to use the night-chair, much mischief may arise from the effort. Mr. Cline had operated upon a patient for strangulated hernia; and some hours after the operation the patient got out of bed to use the night-chair, and from the exertions he made in getting up and in passing his motion, the intestine, which had been reduced, again descended into the sac: Mr. Cline again reduced the Necessity of the recumbent position.

Case.

intestine, and gave strict orders for the man to keep the recumbent position, and the patient ultimately did well.

Usually, if the patient be left to himself, he will have some natural stools in a few hours after the operation; but, if several hours elapse without an evacuation, either castor oil or sulphate of magnesia should be given, or a purgative enema, containing colocynth, or castor oil, should be thrown up, and the abdomen should be fomented with spirituous fomentation, which will assist the action of the bowels, and afford much comfort to the patient.

Medicines. As the safety of the patient depends much upon procuring evacuations from the bowels, the exhibition of opium soon after the operation should, if possible, be avoided; but if the irritability of the stomach continue, or if the patient have a troublesome cough, it should be administered in conjunction with calomel.

Purgatives. It is not only necessary to procure evacuations from the bowels soon after the operation, but it is extremely desirable to keep up a free action upon them for several days following; as I have frequently known patients die in a few days after the operation with constipation and peritoneal inflammation, although they had passed several stools

within twenty-four hours after the strangulation had been relieved.

Should the patient go on well, the wound should be dressed on the third day, and afterwards daily. The sutures may be removed on the fourth and fifth day; but the patient must be kept in bed until the wound is entirely closed.

Sutures removed.

When the operation has been performed at any early period after the strangulation has taken place, the patient generally does well; but when much time has elapsed from the strangulation of the hernia before the performance of the operation, dangerous symptoms frequently arise.

Operation successful.

Sometimes the intestine does not recover its function, when the vomiting and constipation continue, and the patient dies.

Sometimes not.

Sometimes peritoneal inflammation continues, in which case the abdomen is extremely tender and tense, although the bowels are open, and the life of the patient is soon destroyed. The best means of relieving this inflammation are by local and general bleeding, fomentations, purgatives, and extremely low diet.

Peritoneal inflammation.

Occasionally the patient is attacked with a violent diarrhæa, which continues for many days, producing so great a state of debility as to prevent recovery. In such

Diarrhæa.

cases, the treatment I have found most efficacious, consists in exhibiting small doses of opium frequently, and the employment of injections of starch and opium, with a light but nutritious diet, as gruel, or milk, with isinglass, &c.

Hiccough. In a few instances I have known a troublesome hiccough continue for several days after the operation, but entirely unconnected with gangrene, being the result of peritoneal inflammation.

Case. The most remarkable example of this kind I ever met with, was in a gentleman at Maidstone, for whom I performed an operation upon a large strangulated intestinal hernia. The symptoms had been unusually severe, and inflammation had taken place in the peritoneum. The abdomen continued tender to pressure for several days after the operation, and the hiccough continued until the sixth day. The patient was bled and purged freely, and he eventually recovered. As this symptom depends upon inflammation of the peritoneum when gangrene has not taken place, the proper means of relieving it are the same as directed for the inflammation of this membrane, as local and general bleeding, purgatives, &c.

The operation does not prevent a future protrusion.

The performance of the operation for strangulated hernia does not prevent the future descent of the intestine or omentum, but per-

haps renders the patient more liable to its recurrence, as the mouth of the sac is by the operation considerably enlarged. It is, therefore, perfectly necessary before the patient be allowed to get up, or use any exertion, that he should be fitted with a truss, which will effectually prevent any protrusion, by keeping the mouth of the sac closed, otherwise he may in a short time again become the subject of strangulated hernia.

When the truss is first applied, a dosil of lint should be placed under the pad, to protect the recently healed wound.

Truss to be again applied.

In consequence of a radical cure not being produced by the operation I have described, some persons have recommended the removal of the hernial sac by excision or ligature, or that it should be returned into the abdomen.

Removal of the sac recommended.

In a patient of Mr. Holt's, at Tottenham, I had an excellent opportunity of seeing the effects of removing the sac by excision. A woman, who, for several years, had been subject to a femoral hernia, applied to Mr. Holt, on account of the swelling having become so painful and tender as to prevent her from following her ordinary occupations, although the bowels appeared to act very regularly. Mr. Holt requested me to visit the patient with him, and I made many ineffectual attempts to reduce the hernia, and in a few

Case.

days afterwards I recommended Mr. Holt to operate, as the symptoms had not in the least subsided. On opening the hernial sac, a small portion of intestine was found at the mouth of the sac, inflamed, and adherent to it. Mr. Holt carefully separated the adhesions, and returned the intestine into the abdomen. The sac itself being but little attached to the surrounding parts, I requested Mr. Holt to allow me to remove it, which I did, close to the mouth of the sac. I then closed the orifice by sutures, and the external wound was treated in the usual way. On the sixth day, the ligatures came away, and the wound was closed on the tenth. I saw this woman a month after the operation, when she had a hernia nearly as large as the one for which the operation had been performed, and at the same spot; she was subsequently obliged to wear a truss constantly, to prevent the protrusion of this hernia.

Removal
of the sac
not suc-
cessful.

From this it appears that the removal of the sac will not prevent the re-formation of a hernia, nor do I think, upon reflection, that it scarcely could be expected to do so, as the aperture from the abdomen remains equally large, and the peritoneum alone offers resistance to the formation of another hernia, and this had been insufficient to prevent the protrusion of the first.

The removal of the sac by ligature is equally objectionable, even if it could be done without risk, which it hardly could, more especially in oblique inguinal hernia, as the ligature ought, in such cases, to be applied close to the internal ring, which could not be done without a very tedious and hazardous dissection; besides, the spermatic cord is sometimes divided by the sac, which would increase the difficulty and danger of such an operation.

Objection to removal of the sac by a ligature.

The great danger of this operation is in the inflammation, which is likely to be induced by the action of the ligature upon the peritoneum, and in this inflammation extending to the cavity of the abdomen.

Danger of.

Of Large Herniæ.

In very large inguinal herniæ a very different mode of operating is required, to that which I have already described, for the following reasons:—

Different operation required.

When a large hernia has existed for some time, the cavity of the abdomen becomes diminished, from the habitual loss of a large portion of its natural contents, and such a resistance is offered when any attempt is made to return the contents of the hernial

Difficulty of reducing.

sac, that the intestine sometimes gives way, or is lacerated from the violence employed in attempting to reduce it, and even if it can be returned, the slightest exertion will occasion a further protrusion.

Danger
from the
taxis.

Also, in large hernia, a considerable extent of protruded intestine being submitted to much violence in the attempt to reduce it, often gives rise to inflammation, which may produce fatal consequences.

Extensive
adhesions.

Sometimes extensive adhesions have been formed between the sac and protruded intestine, or the portion of peritoneum which has descended, and is forming part of the sac, may have brought with it a portion of the intestine, to which it is naturally closely connected, as the cœcum, and which thus becomes irreducible: in either case the reduction of the hernia is of course prevented.

Mode of
operating.

Instead of performing the same operation, as in other cases, I should, under these circumstances, merely expose the upper part of the hernial sac, and divide the stricture without opening the peritoneum, unless the seat of stricture happened to be seated in the mouth of the sac itself.

Case.

The first time that I had an opportunity of performing the operation in this manner, was upon a patient of Mr. Birch's, in St. Thomas's Hospital. The man was between

fifty and sixty years of age, and had been subject to a hernia from his infancy, which, becoming strangulated, and not yielding to the usual measures, rendered an operation necessary. From the size of the hernia, which reached half way to the knees, and its duration, I conceived that such adhesions might have occurred as would render its reduction impossible, and that the ordinary mode of operating would be extremely hazardous, on account of exposing so large a surface of intestine; I therefore determined upon trying what could be effected by a division of the stricture, without opening the hernial sac.

I commenced by making an incision, be- Operation.
 ginning about one inch and a half above the external abdominal ring, and terminating about the same distance below it; this exposed the tendon of the external oblique, and the fascia of the cord. I then carefully made an opening into the latter, large enough to admit a director, which I introduced, and upon it divided the fascia so as to expose the cremaster muscle as far as the external ring; after this I passed the director between the cremaster and edge of the external ring, and introducing a probed bistoury, I cut through a part of the tendon of the external oblique, so as to enlarge the external ring. On passing my finger into the inguinal canal, to the edge

of the transversalis muscle; I felt some further resistance, and again introducing the director, I carefully separated some fibres of this muscle. The contents of the hernial sac were then reduced, and the edges of the wound being approximated, the patient was put to bed.

The wound healed kindly in about three weeks, although the hernia was protruded upon the slightest exertion, which would have occasioned much irritation, had the sac been opened. The patient was subsequently obliged to wear a laced bag truss.

Division of
the stric-
ture.

Should the stricture be seated in the neck of the hernial sac itself, of course the division of the parts exterior to it, will not relieve the strangulation; in this case the sac must be opened carefully at the upper part only, so as to allow of a division of the stricture.

Care in
returning
the vis-
cera.

Having divided the stricture, the surgeon must avoid violence in attempting to return the protruded parts, for the reasons I have before mentioned. I have known the intestine ruptured in forcibly endeavouring to effect the reduction after the liberation of the stricture. The case occurred in St. Thomas's Hospital, and terminated fatally. The ruptured intestine is preserved in the collection at that Hospital.

Some surgeons object to the division of

the stricture without opening the hernial sac, urging that the intestine or omentum may be in a gangrenous state, and that this cannot be ascertained unless the sac be opened ; but I should imagine that a very limited experience would enable the surgeon to form an accurate opinion in this respect.

Of Herniæ in the Inguinal Canal.

The oblique hernia is sometimes confined entirely to the inguinal canal, and does not emerge through the external ring. It is often difficult to detect in the living subject, as there is no distinct tumor perceptible, but merely a fulness above Poupart's ligament. When strangulated, the usual symptoms are present, and the part is very tender on pressure, or during coughing.

Appear-
ance.

This hernia is covered by the superficial fascia, the tendon of the external oblique muscle, by a thin fascia from the edge of the internal ring, and in part by the cremaster muscle, the spermatic cord and the epigastric artery lie posterior to it.

Coverings.

These herniæ, when strangulated, are often mistaken for cases of peritoneal inflammation, as the patient is not conscious of having a swelling ; and thus he may fall a victim to

Mistaken.

the disease, without a suspicion of its true nature.

Case.

A patient was admitted into St. Thomas's Hospital with a hernia of this description, strangulated, which was treated as peritoneal inflammation, for five days before the true nature of the complaint was discovered. There was a fulness above Poupart's ligament, which was painful on pressure or during coughing; and on pressing the part, a small tumor appeared at the external ring, which disappeared when the part above was not pressed.

The operation was performed, and a portion of the circumference of one of the small intestines was found strangulated, but not gangrenous. Although the strangulation had existed for so long a period, and the patient had suffered from hiccough, and extreme tenderness of his abdomen, yet he ultimately recovered.

Mode of
operating.

The mode of operating in these cases is as follows:—The hair having been removed from the part, and the patient being placed in a convenient position, an oblique incision is to be made, commencing at the upper part of the swelling, about mid way between the anterior superior spinous process of the ilium and symphysis pubis, and terminating a little above the external abdominal ring. This

incision should divide the integument and superficial fascia, and expose the tendon of the external oblique muscle, which is to be carefully cut through in the same direction, when the hernial sac will be seen covered by a very thin fascia, which is given off from the upper aperture. Part of the cremaster muscle is also found covering the lower part of the sac. The sac is to be opened with the usual precautions, and the stricture, which will be found at the upper orifice, is to be carefully divided upwards, by first passing a small director under it, and then introducing the hernia knife upon the director.

The return of the hernial sac into the cavity of the abdomen has been recommended in this form of hernia ; but it does not appear that any advantage is gained by it, independent, in many cases, of the difficulty of effecting it.

Hernial sac
returned.

Mr. Weld, junior, surgeon, at Romford, Case. having occasion to perform an operation upon a woman, on account of the strangulation of a hernia of this kind, after liberating the stricture, returned the sac into the abdomen. The woman recovered, but some time after became the subject of hernia at the same spot, as she would not wear a truss after the operation.

I am indebted to my friend Mr. Thomas

Blizard, for the following curious and interesting case of hernia, descending behind the spermatic cord, which had been accompanied with hydrocele, in the tunica vaginalis of the same side.

Case.

The patient had been the subject of hernia on the right side, for six years, for which he had worn a truss; and from his own account a hydrocele had formed on each side, two years previous to his coming under the care of Mr. Blizard; but that on the right side had gradually disappeared, leaving the testis wasted and drawn up to the groin.

The hernia becoming strangulated, and not yielding to the usual means employed for reducing it, Mr. Blizard performed the operation about twenty-four hours after the commencement of the symptoms. Having laid bare what he thought was the hernial sac, he punctured it, and then freely opened it upon the director. It extended through the external ring, into the inguinal canal, which Mr. Blizard in part cut open, in order to make the necessary examination of what he conceived to be the hernial sac; this, however, proved to be the tunica vaginalis, which had formerly been distended by the hydrocele, having the hernia seated behind it. The posterior part of this tunic was then cut through, exposing the hernial sac, which was found to

contain a portion of intestine nearly of a black colour, from strangulation. The stricture which was seated at the mouth of the sac was divided in the usual manner, and the intestine returned. The patient did well. Mr. Henry Cline had occasion to operate upon a similar case.

Of Inguinal Hernia in the Female.

The structure of the inguinal canal in the female is very much the same as that which I have described in the male, only that the round ligament in the former takes the place of the spermatic cord existing in the latter.

Structure
of parts.

The round ligament, which commences at the fundus uteri, passes from the abdomen midway between the anterior superior spinous process of the ilium to the outer side of the epigastric artery, above Poupart's ligament, and below the transversalis and internal oblique muscles, as the spermatic cord in the male; it takes a course obliquely downwards, and inwards to the external abdominal ring through which it passes, and is lost upon the pubes.

Round
ligament.

This round ligament, however, being much smaller than the spermatic cord of the male, passes through openings corresponding to its size, which are consequently much less

than those for the spermatic cord, and on this account the formation of inguinal hernia in the female is of comparatively rare occurrence.

Course of
the hernia.

When this hernia does occur in the female, it takes the course of the round ligament, is at first confined to the inguinal canal, where it is covered by the tendon of the external oblique, and subsequently it protrudes through the external ring, and forms a swelling at the upper part of the labium, which seldom acquires a large size; here it is covered by a superficial fascia given off from the tendon of the external oblique.

Causes.

It is produced by the same causes in the female as in the male, and presents the same symptoms. The sac usually contains either intestine or omentum, or both, but sometimes the appendages of the uterus are found in it.

Less liable
to mistake
than in the
male.

As the round ligament in the female is not liable to the same affections as the spermatic cord of the male, the hernia in the former case is not likely to be confounded as it frequently is in the latter case with such diseases. I have, however, known this form of hernia in the female mistaken for a femoral hernia, which may readily be imagined when we recollect the proximity of the parts concerned.

A careful examination will readily enable the surgeon to distinguish between the two, as in the inguinal, the neck of the tumor is above Poupart's ligament and in the femoral below; in the former, also, the spinous process of the pubes can be readily felt outside the swelling, which it cannot be in the latter.*

How distinguished from femoral.

When this hernia can be reduced, a truss, similar to that necessary for a male, is to be employed.

Reducible.

When irreducible, the same treatment as recommended for the male will be proper. If intestinal and small, a truss with a hollow pad; if omental, a common pad; and when the hernia is very large, a T bandage, to give support, and prevent increase.

Irreducible.

Should this hernia become strangulated, the taxis should be first employed in the same way as in the other sex; and should this not succeed, bleeding, the warm bath, ice, the tobacco enema, or other means to assist reduction, should be had recourse to.

Strangulated.

The usual means having failed to relieve the strangulation, an operation becomes ne-

* Another good diagnostic mark is in the direction of the impetus given to the swelling, when the patient coughs or sneezes; in inguinal hernia being downwards, and in femoral, upwards from the thigh.—T.

cessary, which should be performed in the following manner.

Operation.

The hair having been removed from the surface of the tumor, and the patient being placed in the same position that I directed the male should be under similar circumstances, the surgeon should make an incision through the integument, commencing a little above the external abdominal ring, and terminating at the lower part of the swelling. This exposes the fascia covering the hernial sac, which should next be carefully divided to the extent of the first incision. The sac, being thus laid bare, should first be cautiously punctured as before mentioned, and then should be further opened upon the director.

The portion of the hernial sac below the external abdominal ring may perhaps contain only a quantity of the dark serum usually found; in which case the operator must introduce his finger into that part of the sac which is in the inguinal canal, and there he will feel the portion of intestine or omentum which is strangulated. He should then slit up the canal and sac towards the anterior superior spinous process of the ilium, so as to expose the strangulated parts; and, ascertaining the seat of stricture, he should pass a small director under it, and carrying

the hernia knife upon the director, the stricture should be divided upwards, or upwards and outwards, after which the protruded parts are to be returned, if they be not in a state of gangrene.

The last case of inguinal hernia in the female, in which I had an opportunity of witnessing the operation was under the care of Mr. Forster, in Guy's Hospital.

Upon opening the sac below the external ring, a quantity of fluid escaped, but there was not any appearance of intestine or omentum. However, upon passing the finger into the sac, through the external ring, a portion of intestine could be distinctly felt, which Mr. Forster subsequently exposed, by slitting up the inguinal canal. The stricture, which was seated at the internal ring, was divided upon a director in the usual manner, and the patient did extremely well. Case.

The after treatment does not differ from that I have directed for the other sex. After treatment.

When the inguinal hernia in the female has not descended through the external ring, it may become strangulated, and occasion fatal consequences, as in the male, without its existence having been recognised during the life of the patient. In the inguinal canal.

A patient was admitted into St. Thomas's Hospital, under the care of Sir Gilbert Blane, Case.

with symptoms of strangulated hernia; but, upon being closely questioned by Sir Gilbert, she denied the existence of any tumor at the groin, navel, or elsewhere, and the case was consequently treated as one of inflammation. The woman died; and Sir Gilbert, supposing that some concealed hernia might have been the cause of her death, inspected the body, and found a small strangulated inguinal hernia on the right side, which did not protrude an inch from the internal ring.

Operation. When necessary, the operation in this case is similar to that required for the same disease in the male.

I have never seen direct inguinal hernia in the female.

Of Congenital Hernia.

No proper sac. In this hernia the protruded parts have not any proper peritoneal sac, as the common inguinal hernia, but are contained in the tunica vaginalis of the testicle. All herniæ seated in this cavity are not, however, congenital, as such protrusion may occur at the adult period for the first time.

Origin. This hernia is originating from the descent of the testicle in the fœtus. Usually about the seventh month, the testicles, which are up

to that period seated upon the loins, begin to descend into the scrotum. At this time, a strong ligament is found connected with the inferior part of the testis and epididimis, and passing to the scrotum in the same direction as the spermatic cord is afterwards placed; it is called the gubernaculum, and appears to guide the testicle into the situation provided for it.

The testicle and its vessels are covered by peritoneum, except just where the latter enter at the posterior part of the former.

In its descent, the testicle takes with it a portion of peritoneum, which afterwards becomes the tunica vaginalis; and it is usually found in the scrotum at the ninth month; but there is considerable variety as to the period when the descent is complete, sometimes being earlier or later than the ninth month, sometimes one testicle comes down first, and the other does not descend until some time afterwards. In some cases, the testicles never quit the abdomen, and in others they only descend to the groin.

Descent of
the testicle.

When the testicle has reached the scrotum, the opening through which it quitted the abdomen generally closes, but at what period is not precisely ascertained. If, however, it should remain open at the time of birth, the efforts of the child in breathing or crying

cause the protrusion of a small portion of intestine into the cavity, and thus the congenital hernia is formed.

Called the
windy
rupture.

From its appearance and feel, more particularly when the child cries, the nurses call it the windy rupture, in opposition to the term watery rupture, which they apply to an hydrocele, when it occurs in the infant, and this is not very unfrequent.

Sometimes
occurs at
the adult
period.

I have found the tunica vaginalis sufficiently open at the adult period to admit the introduction of a female catheter; and I have known hernia, similar to the true congenital form, occur in persons between twenty and thirty years of age. In these cases I imagine the opening at first to have been so small as not to admit the descent of a hernia under ordinary circumstances, but that when the patients have been under the necessity of doing very laborious work, or during a state of great relaxation, the protrusion has taken place.

Course.

The congenital hernia must necessarily take the course of the spermatic cord, passing in the same direction as an oblique inguinal hernia, from which it is to be distinguished by the following marks. In common oblique inguinal hernia, the testicle is perfectly distinct from the hernial sac; whereas, in the congenital disease, the testicle is confounded

with the sac. In the latter case, also, the appearance of the part very much resembles that of a hydrocele; more especially if, as sometimes happens, a quantity of fluid descends into the sac with the intestine or omentum which, upon a close inspection, gives a transparent appearance to the swelling. To distinguish these joint diseases, the contents of the hernia should be returned into the cavity of the abdomen whilst the patient is in a recumbent posture; after this, a moderate pressure is to be made against the abdominal ring, with the finger, so as to prevent the descent of the intestine or omentum; if the patient then assume the erect position, the water will escape into the tunica vaginalis, but the intestine or omentum will be felt pressing against the finger above.

Sometimes the testicle does not descend to the bottom of the scrotum, and then, if a congenital hernia form, the tunica vaginalis becomes elongated, and reaches considerably below the situation of the testicle.

In the congenital form of hernia, also, the cord is occasionally divided, the artery and vein being on one side, and the vas deferens taking its course on the other side.

Division of
the cord.

When the congenital hernia is reducible, it requires the use of a truss, as the common

Reducible.

inguinal hernia, provided that the testicle has completely descended into the scrotum, or does not rest at the groin. For the first three months, perhaps a pad and bandage may be sufficient to prevent the descent of the hernia; but after this period a truss with a spring may be employed with safety, or even at a younger period if necessary.

Testicle in
the groin.

If the testicle be seated in the groin, a truss cannot be worn without risk of injuring the gland, and it is better to allow of such a protrusion as will assist the complete descent of the testicle, before any truss or other means of suppressing the hernia be resorted to.

Case.

A young man who now holds a situation of importance, and who is the father of several children, was brought to me formerly by his father, on account of his having a congenital hernia; but because the descent of the testicle on the same side was incomplete, I directed that the protrusion should not be retarded. The testicle afterwards descended into the scrotum, a truss was then applied for the hernia, and the disease was ultimately subdued.

Closure of
the tunic.

After the truss has been worn for some time, the tunica vaginalis becomes closed at the upper part, and near the testicle, but sometimes remains open between, allowing a space for the deposit of fluid which occa-

sionally takes place, forming hydrocele of the cord, and for the cure of which I have had to perform an operation on several occasions.

With regard to the treatment of this hernia Irreducible. in the irreducible state, the same as directed for common inguinal hernia, is here applicable; and when strangulated, the same means as recommended in the latter case, should be employed for the relief of the patient.

When an operation is required, it should Operation. differ from that described as necessary for common oblique inguinal hernia, in the following particular. Having laid bare the tunica vaginalis, it should not be opened low down on account of exposing the testicle, but a sufficient quantity of the tunic should be left whole to cover this gland.

On opening the tunica vaginalis, a much Large quantity of fluid. larger quantity of fluid generally escapes than is found in the sac of a common inguinal hernia.

The seat of stricture will be generally Seat of stricture. found under the edge of the transversalis muscle, or at the internal ring, when it should be divided in the same manner as in other cases of hernia; after which, the protruded parts, if not adherent, should be returned. If extensively adherent, the stricture should be divided in the same way, but the surgeon should not attempt to separate

the adhesions, unless very few and slight, in order to allow of the return of the parts; but they should be left; and after the wound has healed, a bag truss will be required, as for other irreducible scrotal herniæ.

In operating for this form of hernia, the testicle is sometimes found in the inguinal canal in contact with the intestine; in which case the intestine only should be returned into the abdomen, the testicle being left in the canal. The stricture in this case is at the orifice of the tunica vaginalis.

Of Encysted Hernia of the Tunica Vaginalis.

How formed. This is a particular species of hernia, which occurs in the following manner. The tunica vaginalis becomes closed, by adhesion, opposite the abdominal ring, but remains open above and below it; and when a protrusion of intestine occurs, this adherent portion of the tunic becomes elongated, forming a distinct hernial sac within the proper tunica vaginalis.

Case. I had an opportunity of witnessing the following case, under the care of Mr. Forster, in Guy's Hospital. A man was admitted into the house with symptoms of strangulated hernia, which the usual means failed to relieve, and the operation was proposed and

urged; but the patient would not submit, choosing rather to die. On examining his body after death, a sac was found within the tunica vaginalis, descending from the abdominal ring towards the testicle. This sac contained a portion of one of the small intestines which had become gangrenous. The stricture was at the mouth of the sac.

In operating upon a case of this kind, the Operation.
tunica vaginalis should be opened freely, to expose the sac, otherwise some difficulty may arise.

Mr. Hey, in his surgical observations, has related a case similar to that of Mr. Forster,

LECTURE XXXIV.

On Femoral Hernia.

Anatomy
of the
parts.

BEFORE I proceed to describe the symptoms of femoral hernia, I shall give an account of the anatomy of the parts directly or indirectly concerned.

Superficial
fascia.

The superficial fascia, which covers the external oblique muscle, is continued down over Poupart's ligament upon the thigh, where it is found of considerable density, and serves to keep the superficial veins and absorbent vessels in their proper situations.

Crural
arch.

Under Poupart's ligament, which stretches from the anterior superior spinous process of the ilium, to the spinous process of the pubes, is a space called the crural arch, which gives passage to the femoral artery and vein, the anterior crural nerve, and psoas and iliacus internus muscles, with absorbents, &c.

Gimbernat's
ligament.

From that portion of Poupart's ligament which is inserted into the spine of the pubes, a process is given off, extending downwards and outwards, and attached to the ligament of the pubes over the linea-ileo-pectinea; it presents a concave edge towards the femoral

vein, and is known under the name of Gimbernat's ligament.

Two fasciæ are given off above from Poupart's ligament, one passing upwards between the peritoneum and transversalis muscle, which is called the fascia transversalis; a second fascia extends between the peritoneum and iliacus, and psoas muscles, called the fascia iliaca. From another part of the fascia transversalis, a process passes down under Poupart's ligament, through the crural arch, to the sheath of the femoral vessels, forming its anterior part, and the fascia iliaca forms the commencement of the posterior portion.

Fascia transversalis and iliacus.

In this sheath are situated the femoral artery and vein, the anterior crural nerve not being included. The vein is placed most internal, and about five-eighths of an inch to the outer side of Gimbernat's ligament; the artery lies outside of the vein, and the nerve still more exterior. The artery and vein are separated by a septum.

Sheath of the femoral vessels.

Under the superficial fascia of the groin, and extending from the inferior part of Poupart's ligament, is a strong fascia, called fascia lata, which has two attachments above, but becomes united below. One portion is joined to Poupart's ligament from the spinous process of the pubes to the anterior superior spinous process of the ilium;

Fascia lata.

and, passing downwards, covers the femoral artery and vein, the anterior crural nerve, and the muscles on the outer and fore part of the thigh.

**Falciform
process.**

From its origin at the spine of the pubes, a defined edge passes a little outwards and downwards, in a crescentic form, over the sheath of the femoral vessels, then curves inwards, and a little upwards, under the saphena major vein, and is united to the second portion. This second portion is connected above with the ligament of the pubes close to the insertion of the external oblique muscle; it then passes inwards and downwards upon the psoas, iliacus internus, and other muscles, to join that part which I described as passing under the saphena major vein. From the union of these two portions, the fascia lata of the thigh results anteriorly.

Between the free internal edge of the first, and the origin of the second portions, as low down as their junction under the saphena major vein, an opening is left, exposing a part of the femoral sheath. This space is filled above by absorbent glands; the absorbent vessels from which, here perforate the sheath of the femoral vessels, to pass to the glands in the abdomen. At the lower part of the space, the saphena major vein

penetrates the sheath to enter the femoral vein about an inch below the crural arch.

If the fascia lata be entirely removed from the upper part of the thigh, the muscles and anterior crural nerve are exposed, but the femoral artery and vein remain enclosed in their proper sheath.

On opening the femoral sheath, the artery and vein are exposed; the former situated to the outer side of the latter, and about three inches from the symphysis pubes. The sheath, about two inches downwards, becomes intimately connected with a portion of the fascia lata. It has somewhat a funnel shape, being larger above, and contracted below, where it joins the fascia lata.

Sheath
funnel-
shaped.

The epigastric artery, in its course upwards and inwards from the external iliac, passes from one-half to three-fourths of an inch from the opening where the absorbents enter the abdomen. There is, however, considerable variety in the origin of this vessel.

Epigastric
artery.

To view the orifice of the crural sheath from above, the peritoneum, which covers it, must be taken off, when the relative situations of the vessels, entering the sheath, will be distinctly seen, as also the descent of the two portions of fascia to form the sheath, that from the fascia transversalis

Orifice of
the sheath.

above the vessels, and that from the fascia iliaca beneath them.

Difference
in the male
and female
pelvis.

From the difference in the formation of the pelvis in the male and female, the space forming the opening to the femoral sheath is largest in the latter, on which account they are more liable to the formation of femoral hernia.

Commence-
ment of the
hernia.

When a femoral hernia commences, the patient's attention is first directed to the part on account of experiencing pain on suddenly straightening the limb, as in rising from a sitting posture. This is occasioned by the extension of the fascia lata, and its pressing on the protruded parts.

Appear-
ance of the
hernia.

On examining the seat of pain, a fulness is discovered at the upper and inner part of the femoral sheath, which disappears on pressure, or when the patient is recumbent. This fulness soon increases, so as to form a tumor about the size of a small walnut, which is situated immediately below Poupart's ligament, to the inner side of the femoral vessels, and to the outside of the spine of the pubes. As the swelling enlarges, it projects more forwards and upwards, turning up over Poupart's ligament; as it meets with the least resistance in this direction.

Like an
enlarged
gland.

When the tumor is small, from its situation and circumscribed feel, it has much the character of an enlarged inguinal gland.

The direction of this hernia is at first a little downwards in the femoral sheath, then obliquely inwards and forwards, and lastly upwards; sometimes, however, instead of turning up over Poupart's ligament, it takes a course downwards, in the direction of the saphena major vein; but this very rarely happens.

Direction
of the
hernia.

On dissecting a femoral hernia, the following appearances present themselves. On cutting through the integument, the fascia superficialis is exposed; this, in its natural state, is thin and delicate; but frequently, when hernia exists, the fascia becomes dense and tough from pressure. Under this fascia a portion of the sheath of the femoral vessels is found, which closely envelopes the hernial sac itself; it is that portion which is perforated for the entrance of absorbent vessels.

Dissection
of the
hernia.

This covering I first became acquainted with in examining a patient in St. Thomas's Hospital, in the year 1800, and have since invariably found it, when operating for this form of hernia. It may be termed the fascia propria of the hernia.

Fascia
propria.

Beneath this covering, and between it and the sac itself, there is generally some adipose matter situated, on separating which the sac is laid bare. This layer of adipose matter I have known to be mistaken for omentum.

Mistaken
for other
diseases.

The femoral hernia is much less likely to be confounded with other diseases than the inguinal, on account of the much more frequent formation of various tumors in the situation of the latter; but still there are some diseases which I have known to be mistaken for femoral hernia, and in the discrimination of which much care is requisite.

Enlarged
gland.

In several instances, an enlarged gland in the groin has been mistaken for a femoral hernia; and, on the contrary, the hernia has been treated as an enlarged and suppurating gland; but such mistakes must arise from inattention to the previous history of the case.

Case.

Some years ago, a man was admitted into Guy's Hospital with a strangulated hernia, over which a poultice had been applied for three days before his admission, under the supposition that it was a bubo. The operation was performed, and the intestine found gangrenous.

Case.

Mr. Bethune, surgeon, at Westerham, in Kent, assured me, that he saw a patient who had been the subject of a strangulated femoral hernia, which had been poulticed for some days, and at length opened, when air and feculent matter escaped, and the patient died ten days after.

When a femoral hernia and enlarged gland exist at the same time, an attentive and minute examination is sometimes requisite to ascertain the existence of the former.

Hernia
and en-
larged
gland.

I once saw a lady with Mr. Owen, surgeon to the Universal Dispensary, who had suffered from symptoms of strangulated hernia for nine days, and had been treated for inflammation of the intestines, as she had not mentioned the existence of a swelling in her groin. Mr. Owen discovered this swelling, and in consequence requested me to visit the patient, at the same time informing me, that the tumor had not the feel of a hernia, but that he supposed it must be one from the symptoms. Upon examining the part, I found an enlarged gland, about the size of a walnut, very hard, and moveable; but beneath this gland, and separate from it, was an elastic tumor, which I succeeded in reducing by the employment of the taxis; and this relieved the patient from all the symptoms of strangulation.

Case

Some of the symptoms attending psoas abscess resemble those of a femoral hernia, and might lead to mistake. Psoas abscess makes its appearance in the groin in the same situation as a femoral hernia; it dilates when the patient coughs, and is less apparent when the person is in a recumbent posture,

Psoas
abscess.

than when he is erect. It may, however, be readily distinguished from hernia by the pain in the loins, which precedes the appearances of the swelling, by the general constitutional derangement attending it, by its more rapid increase, and by the absence of intestinal derangement.

Inguinal
hernia.

The error of most consequence respecting femoral hernia, is, that of mistaking it for inguinal hernia. Danger arises under such circumstances, from the operation of the taxis, the direction to make pressure in the femoral being quite different from that proper in the inguinal; but the most serious mischief is likely to arise, if an operation be necessary, in the division of the stricture.

Case.

I was once sent for to operate on a patient for a strangulated inguinal hernia, which, on examination, I found to be femoral, and succeeded in reducing it, by making the pressure in the proper direction; and I have known operations performed as for inguinal hernia, when the disease has been femoral. These mistakes arise from the femoral protrusion turning up over the crural arch or Poupart's ligament; and much attention is often requisite in making an examination, before the surgeon can confidently decide on the true nature of the disease. The best marks of distinction which I have observed,

are, that the neck of the femoral hernia is below and to the outer side of the spine of the pubes, while that of the inguinal hernia is above the spine; also, by drawing down a femoral hernia, Poupart's ligament may be traced above it, which it cannot be, if the disease be inguinal.

I have seen a case of enlargement of the femoral vein, which had somewhat the appearance of a femoral hernia, but it was readily detected, by pressing on the iliac vein above, while the patient was recumbent, when the tumor immediately appeared.

Varicose vein.

Femoral hernia is most frequent upon the right side, probably on account of the most persons employing that side in the greatest degree.

This hernia most frequent on the right side.

Women who have borne many children are more liable to this disease than others, which arises from the extension of the abdominal parities during gestation, causing a more relaxed state of the parts; also, old persons are more frequently troubled with this disease than the young.

Mothers liable to it.

Most frequently the protruded part in femoral hernia is small intestine, very rarely only omentum, but occasionally both intestine and omentum. I have seen the cœcum in a femoral hernia on the right side, and the ovaria have also been found in the hernial sac.

Most frequently intestinal.

Causes. The femoral hernia is produced by the same causes as occasion the formation of inguinal hernia, except that I do not recollect a single instance in which this disease has been originated by a blow.

Treatment of the Reducible Femoral Hernia.

Danger of strangulation.

From the small size of the opening through which femoral hernia passes, the patient is in great danger from strangulation, unless proper means be adopted to prevent the descent of the viscera.

Truss.

The employment of a truss is the only method by which the safety of a patient can be secured; but the truss required for femoral hernia must be of somewhat different construction to that which is required in inguinal hernia.

The pad, instead of being continued nearly in a straight direction with respect to the spring, as when required for inguinal hernia, should project downwards, nearly at right angles, to the spring, that it may effectually press upon the opening through which the hernia protrudes under Poupart's ligament, and also upon the upper part of the thigh.

To be constantly worn.

The truss should be constantly worn, as for inguinal hernia, to prevent the protrusion

of the hernia, and also with the view of obliterating the mouth of the sac, and curing the disease.

It is very rare, however, that a cure is effected in femoral hernia by means of the truss, but still it is right that it should be constantly kept on. I have known many instances in which the constant application of the truss has not produced the smallest apparent alteration in this hernia; the reason is, because Poupart's ligament, and the fascia lata, support the pressure of the truss, and the constant variation in the tension of these parts on every movement of the body, prevents the steady pressure necessary to produce a gradual closure of the opening.

Does not
cure.

In some cases, when the opening of the femoral sheath is large, it will be necessary to have a larger pad, and a stronger spring to the truss, and the pad may be more effectually kept in place, by means of a strap passed from it round the upper part of the thigh.

If a hernia exist on both sides, a double truss will be required, made upon the same principles as the single one.

Double
truss.

The truss made by Salmon and Ody's, I have generally found best adapted to these cases.

Salmon and
Ody's
truss.

Of the Irreducible Femoral Hernia.

Causes. Femoral hernia may become irreducible from adhesions of the protruded parts to the interior of the hernial sac; from a growth of the protruded parts within the sac, so that they cannot repass the opening into the abdomen, or by a contraction at the neck of the sac itself, producing the same consequences.

Treatment. In either case, a truss should be applied with a hollow pad, which is to receive the tumour, and prevent its increase.

Case. A gentleman consulted me, in consequence of his having an irreducible femoral hernia, which, upon examination, I thought only to contain omentum; I directed him to wear a truss, with a depression in the pad, just large enough to receive the tumor. Two or three years afterwards, I saw this gentleman again, when I was gratified in learning, that his hernia had nearly disappeared. This was in consequence of absorption of the omentum having been produced by the pressure of the pad.

Truss cannot always be worn.

If the hernia be entirely intestinal, this form of truss, with a hollow pad, cannot always be borne, as I have known it to create very severe suffering.

Of Strangulated Femoral Hernia.

The symptoms of strangulation being the same as those I have already detailed in the lecture on inguinal hernia, I shall not again repeat them, but merely observe, that in femoral hernia, they are usually more urgent on account of the smallness of the opening, through which the protrusion occurs, causing greater pressure. Symptoms.

The patients generally complain of more pain from strangulated femoral than inguinal hernia in the same state, and they die sooner from the former than the latter disease. Severe.

The medical treatment required for strangulated femoral hernia, does not differ materially from that necessary for the inguinal disease. Medical treatment.

In the first place, the taxis should be employed, but in a different mode to that I have described as proper for the reduction of inguinal hernia. The patient should be placed on a bed, with the shoulders elevated, and the thighs bent at right angles with the body, leaving only sufficient space between them to admit the arm of the operator. The tumor is first to be pressed downwards, until it be below the level of Poupart's ligament, when it is to be kneaded upwards towards the abdomen. Taxis.

The difficulty usually experienced in at- Difficulty.

tempting to reduce this form of hernia, arises from the pressure being made at first in an improper direction, viz. upwards, so that the hernia is forced over Poupart's ligament, instead of beneath it, and in this way the hernia never can be reduced.

Pressure
gentle.

As in the reduction of inguinal hernia, the pressure should be gentle and continued, avoiding violence, which may be productive of the most serious consequences.

General
treatment.

Should the taxis fail, the same general treatment as that directed for inguinal hernia, should be pursued, as bleeding, the warm bath, opium, the application of cold, and the injection of the tobacco glyster. These remedies, however, have much less beneficial influence in femoral, than in the other forms of hernia; which I imagine is owing to the nature of the parts through which the protrusion occurs, and the smallness of the aperture through which it descends.

Symptoms
urgent.

As the symptoms are usually very urgent in femoral hernia, and as the disease more rapidly destroys life, there is the greater necessity for the early performance of an operation, when the usual means to effect reduction have been tried and have failed. I have known a patient die in seventeen hours after the symptoms of strangulation had commenced; and on the contrary, I

have performed an operation with success, after the symptoms had existed seven days ; but in general, the patients labouring under this disease do not survive the strangulation more than four days, if the stricture remain ; whereas, in inguinal hernia, under similar circumstances, they often live a week or more.

Of the Operation for Femoral Hernia.

The hair is to be removed from the surface of the tumor, and the bladder should be emptied. The patient should then be placed upon a table of convenient height, in a horizontal position, but his shoulders should be a little raised, and the thigh bent towards the abdomen, in order to relax the abdominal muscles, &c.

Preparation.

The first incision should commence a little above the superior part of the tumor, towards the umbilicus, and be extended downwards, somewhat to the inner side of the prominent part of the swelling, as far as its middle ; a second incision should then be made from the inner to the outer side of the tumor, at right angles with the first incision, and joining it at the lower part, so that the two together form a figure resembling an inverted *L*.

Operation.

The angular flaps should then be dissected up, to allow of sufficient space for the other steps of the operation.

Superficial
fascia.

The superficial fascia which is thus exposed, should next be divided to the same extent as the integument, by which the covering formed of the sheath of the femoral vessels will come into view ;* this should be carefully cut into, so as to admit of the introduction of a director under it, upon which it should be further opened, so as to freely expose the hernial sac.

Layer of
fat.

If the patient is fat, a layer of adipose matter may be found between this covering, formed of the sheath of the femoral vessels, and the sac itself.

Sheath of
the vessels.

I have known this covering, which I call the fascia propria, to be mistaken for the hernial sac, so that the surgeon who operated, supposed he had opened the peritoneal covering when he cut into the sheath, and after considerable difficulty, he succeeded in pushing up the protruded parts, but on the following day, the patient died ; and when examining his body, it was discovered, that the hernial sac had not been opened, but had been thrust up into the

* There is usually a considerable vein between the superficial fascia, and the fascia propria, as well as absorbent glands.

abdomen with its contents, which still remained in a strangulated state.

The surgeon having exposed the hernial Hernial sac. sac, should pinch up a small portion of its anterior and lower part, between his finger and thumb, carefully excluding any portion of the contents of the sac, and then placing the blade of his knife horizontally, he should cautiously make a small cut into the elevated part, making an aperture of sufficient size to allow of the passage of a director, upon which he should further divide the anterior part of sac upwards and downwards.

A quantity of fluid usually escapes, when Fluid. the sac is first opened, which varies greatly in quantity, and somewhat in colour, according to the period that the strangulation has existed. It is not uncommon, however, for the fluid to be entirely wanting, even when there are no adhesions.

If inflammation runs high, the peritoneal surface of the intestine is covered by adhesive matter.

The next and most important step in the operation, consists in dividing the stricture, Division of the stricture. the situation of which should first be distinctly ascertained by passing the point of the little finger into the hernial sac, on the fore and inner part of its contents.

If the hernia be large, the seat of stricture Seat of.

may be at or under the opening in the fascia lata, through which the covering formed by the sheath of the femoral vessels is protruded; but generally, the stricture will be found immediately beneath Poupart's ligament, in the mouth of the sac itself, where the hernia quits the abdomen.

In either case, a director should be very carefully introduced into the sac, anterior to its contents, and gradually insinuated under the stricture, and upon its grove the hernia knife (before described) should be passed, with its cutting edge turned upwards, and a little inwards, towards the umbilicus, in which direction the stricture should be divided.

Two stric-
tures.

In some cases when the hernia is large, strictures may be found both at the crescentic margin of the fascia lata, and under the crural arch of Poupart's ligament, and each will require division, that at the fascia lata must of course be first liberated.

How
treated.

When a stricture, therefore, exists at the crescentic margin, the surgeon, after dividing it, should make a careful examination, to ascertain if the passage to the abdomen be free, before he attempts to return the protruded parts, for should a second stricture exist, he may rupture the protruded intes-

tine in the violence he must employ in endeavouring to return it.

In dividing the inner stricture, it has been recommended to cut in the direction of Gimbernat's ligament, inwards towards the pubes; but as the stricture is not occasioned by this ligament, there cannot be any necessity for dividing it; I have known Gimbernat's ligament divided, from an idea that it formed the stricture, but the stricture still remained at the orifice of the fascia propria, or in the mouth of the sac itself, and the patient died.*

Direction
of division.

Great caution is requisite in dividing the stricture, if the protrusion be entirely intestinal, and the operator should not introduce the knife, until the intestine has been carefully placed out of danger by an assistant.

Great caution
necessary.

Sometime ago, a case occurred in one of the Borough hospitals, in which the intestine was wounded, when the operator was dividing

Case.

* It is curious, that Gimbernat's ligament should ever have been supposed to be the seat of stricture, as it exists only upon the inner side of the mouth of the hernial sac, and therefore could not influence the outer portion. If strangulated femoral hernia be examined in the dead body, and Gimbernat's ligament be cut through, the hernia is not liberated by such a division, for the orifice of the fascia propria, or the neck of the sac itself, still girt the viscera as much as ever.

the stricture, which he did inwards, towards Gimbernats's ligament; feculent matter was extravasated into the cavity of the abdomen, and the patient died. On examining the parts after death, two openings were found in the intestine, close to the mouth of the sac.*

Adhesions. The treatment I have directed as proper in inguinal hernia, when the protruded parts adhere to the sac, or when the intestine or omentum are gangrenous, is also proper under similar circumstances in femoral hernia.

After treatment. After the operation, the same mode of closing the wound, and indeed the after treatment generally, should be the same as in the inguinal disease.

But little variety. Very little variety is met with in femoral hernia, the most important one is that in which the obturator artery arises from the epigastric, and surrounds the neck of the sac.

Dr. Barclay's preparation. Dr. Barclay, a celebrated teacher of anatomy at Edinburgh, was kind enough to send me a specimen of this variety, which was taken from a patient, whose previous history could not be ascertained.

* Cutting directly inwards is a most dangerous operation in femoral hernia, as the intestine is very likely to be wounded.

Mr. Wardrop has also met with this variety.

Although the obturator artery frequently arises from the epigastric, it is very rarely found passing before the sac in femoral hernia, but usually takes a course to the outer side, and beneath the sac, as I have often witnessed when dissecting the parts of femoral herniæ. My mode of avoiding injury to the epigastric or obturator arteries, is to make a very slight division of the stricture with the knife; and then, by pressure of the finger or of a director, to enlarge the opening.

Common
course of
the obtu-
rator.

In one instance I have met with a large quantity of fluid situated between the fascia propria and the hernial sac. The following is a short account of the case:—

Fluid be-
neath the
fascia pro-
pria.

Miss ———, æt. 20, had been the subject of a femoral hernia on the right side for three or four years, which had acquired about the size of a pullet's egg. In June, 1825, the hernia became strangulated, and increased to a very large size. As she did not mention the existence of the hernia to her medical attendants, it was not discovered until the third day from the commencement of the symptoms, the continuance and severity of which led to an examination. Mr. Wakefield, of Hatton Garden, who had attended her,

Case.

immediately requested me to visit her; when, after trying, without effect, the ordinary means to reduce the hernia, I operated. On opening the fascia propria, I was astonished at the escape of nearly a pint of transparent fluid, resembling that usually drawn off in hydrocele. The hernial sac, which then became exposed, was small; and, on opening it, a little of the usual dark-coloured fluid was discharged. A small portion of omentum, with a fold of small intestine, were protruded. After dividing the stricture, and returning the viscera into the cavity of the abdomen, I removed a large part of loose bag exterior to the sac. The patient recovered rapidly.

LECTURE XXXV.

On Umbilical Hernia.

THIS form of hernia, which is also termed Synonyme. exomphalos, is next in frequency to the inguinal.

The protrusion takes place through the Natural opening. opening in the linea alba, which is formed in the foetal state for the passage of the vessels of the umbilical cord.

After the funis has been tied, this opening How closed usually. usually becomes closed by dense cellular tissue, and the remains of the umbilical veins and arteries, but not by a tendinous structure. The integument over it is adherent, and generally drawn in, forming the navel.

Behind the navel, when these parts are Dissection of the parts. dissected, the peritoneum is found, which adheres more firmly at this part than any other of the linea alba; it is connected above to the remains of the umbilical vein, and below to the ligament of the bladder and remains of the umbilical arteries. There is not any perforation in the peritoneum behind the navel, as the vessels do not penetrate

it, but pass between it and the abdominal parietes.

Commence-
ment of the
disease.

Umbilical hernia commences in a small protrusion about the size of a nut, which can be easily reduced, but which again appears immediately the patient coughs or exerts himself. If neglected, it soon increases in bulk; and, as it augments, it gravitates; so that the larger part of the swelling is below the orifice of the sac, and in some instances it acquires so great a size as to reach to the upper part of the thighs.

Creates
much suf-
fering.

This disease, if intestinal, and not supported, is attended with much danger, and creates a considerable degree of suffering. The patient frequently feels so much weakness and sensation of sinking, as to be incapable of making an exertion. The bowels are very irregular in their actions, and the patient is much troubled with flatulence and nausea.

Symptoms
when in-
testinal.

Besides the frequent occurrence of these symptoms, the intestinal protrusion may be distinguished by its elasticity, its uniform feel, and by the passage of the air, &c. through the canal, producing a gurgling noise.

When
omental.

When the protrusion is entirely omental, the patient experiences but little uneasiness or irregularity of the bowels. The feel of the

swelling is uneven and doughy, and is but little tender under considerable pressure.

Sometimes, if both intestine and omentum are contained in the hernial sac, they can be distinguished from each other by the above-mentioned marks. The omentum is in these cases usually above, and the intestine below. But, most frequently, the quantity of omentum protruded is much larger than that of the intestine, and the latter is covered by the former, so that it cannot be at first distinguished. When both.

The umbilical hernia is very common in infants soon after birth. Intestine is then generally protruded, and the shape of the swelling somewhat resembles the distended finger of a glove in shape; the hernia is easily reduced, unless the opening in the linea alba is very small. Common in infants.

Children, subject to this disease, suffer from griping and a very irregular state of bowels, sometimes being constipated, at others being violently purged.

When this hernia occurs in the adult, if the patient be thin, the shape of the tumor is pyriform and defined; but in fat persons, the hernia is sometimes scarcely perceptible on a superficial inspection, as it extends upwards and downwards, is flattened anteriorly, and has its circumference blended Appearance in the adult.

with the adipose matter, so as not to present any defined edge. The tumor may be flattened in thin persons, but when so, its extent is always evident.

Sac in part deficient.

Although, generally, the hernia has a peritoneal covering, or proper sac, yet, in a few instances, when the disease has been of long standing, and has acquired a very large size, I have seen the sac in part wanting.

Two sacs.

I have also known two sacs to exist at the same time; one protruded by the side of the other, and only separated at their origin by a thin septum.

Case.

Mr. Cline operated twice upon a woman in St. Thomas's Hospital, for strangulated umbilical hernia, in whom two herniæ existed, having their commencement about half an inch apart, but the sacs lying in contact.

Most frequent in women.

Women are much more liable to this disease than men, and the most frequent cause of it is pregnancy, the bowels being pushed up by the gravid uterus as it rises from the pelvis.

Causes.

Another cause is the deposition of adipose matter within the omentum and mesentery, whereby their size is so much increased that the abdomen is hardly capable of containing them. Women who become corpulent after having had many children, are often subject to this disease, on account of the lax state

of the abdominal parietes, not affording sufficient resistance to prevent such protrusions.

The distension of the abdominal parietes, and protrusion of the navel, which is sometimes met with in ascites, is said to be a cause of umbilical hernia; but I am inclined to think that it is more frequently the consequence than the cause of this disease.

Treatment of Reducible Umbilical Hernia.

In infants subject to this disease, the plan In infants. I usually adopt, is, after having reduced the hernia, to apply half of an ivory ball sufficient to cover the opening, and to confine it in that situation by means of adhesive plaister. A linen belt should be applied, and secured round the body, but as soon as the child begins to walk, two straps must be fixed to the lower part of the belt, which should pass under the pelvis, between the thighs, to prevent the belt from slipping.

For the adult, or even for children, when In adults. the hernia is of small size, a spring truss may be employed, made on the same principle as that directed for inguinal or femoral protrusions. The pad of the truss should cover the opening through which the viscera escape; and the spring should pass from the pad to the back of the patient, a little beyond

the spine; and a strap should be continued from the spring to the pad, to complete the circle.

In very fat persons.

When the patient is very corpulent, so that the navel is deep, the portion of ivory may be advantageously placed under the pad of the truss, the more effectually to close the opening of the sac; and this is much better than having a conical pad, which is liable to shift its position when the patient is in motion; but the half globe of ivory does not follow the motions of the pad.*

When very large.

Very large herniæ, accompanied with a lax state of the abdominal parietes, require a different form of truss, as it is necessary to make a more extended pressure. The pad of the truss, therefore, instead of being only of sufficient size to cover little more than the orifice of the sac, must be of considerable extent, so as to press upon a large space round the hernial opening, and thus support the parietes as well as the hernia, which will render the patient comfortable, although there is not any prospect of thus effecting a cure.

* The ivory ball with the adhesive plaister, will, in the adult, prevent the increase of a small hernia, so as to render a truss unnecessary.

Of the Irreducible Umbilical Hernia.

Umbilical hernia becomes irreducible from Causes. the same causes as the inguinal does; viz. adhesions of the intestines or omentum to the inner surface of the sac, or a growth of omentum, rendering it too bulky to repass the opening by which it escaped.

Under these circumstances, the hernia sometimes acquires an enormous size, more particularly in women, whose abdominal parietes have been weakened by frequent pregnancy; and I have in such persons seen the pudendum entirely covered by the hernial swelling. The umbilicus in these cases is brought nearer to the pubes than natural, by the constant weight and drag of the hernia. Becomes very large.

With such a large hernia the patient is exposed to constant danger from blows or falls; besides the weight of the tumor, and an ulcerated state of integument, which often occurs, renders the patient incapable of following any employment requiring bodily exertion. Danger of.

When the hernia is irreducible, and not of Treatment. very large size, a truss should be worn with a hollow pad, as recommended for irreducible inguinal herniæ. The hollow should be just sufficient to contain the swelling, and the

edges should be rounded off so as to prevent any injury from pressure to the surrounding parts. The substance of the cup should be pewter, which should be covered with soft leather. The spring should be of the same kind as that of the common truss.

When very large.

In very large herniæ of this description, a truss cannot be worn; and all that can be done to relieve the patient is to support the swelling by bandages, passed over the shoulders so as to prevent the constant dragging of the tumor.

Of Strangulated Umbilical Herniæ.

Symptoms. The symptoms, indicating strangulation in this form of hernia, are the same as those I have described as existing when inguinal or femoral herniæ are in the same state; but in the umbilical disease they are generally less urgent.

Causes. Strangulation is frequently produced in these cases by the patient taking food not easy of digestion, or such as occasions flatulency; persons having this complaint should therefore eat sparingly, and be careful to avoid all food difficult of digestion, or likely to create flatulence.

The seat of stricture is usually at the tendinous opening through which the hernia protrudes, but sometimes the neck of the sac itself is thickened, and prevents the reduction of the viscera.

Seat of
stricture.

When strangulation exists, the surgeon should first endeavour to relieve the patient by employing the taxis in the following manner. The patient being placed on the back, the shoulders should be elevated by pillows, also the pelvis a little raised, and the thighs bent at right angles with the body. The surgeon should then grasp the swelling with his hand, and direct the pressure a little upwards as well as inwards, because the opening to the abdomen is not usually in the centre of the swelling, unless the hernia is small, or projecting, when the pressure should be made directly inwards. If the neck of the sac can be distinctly felt, the surgeon should knead it with the finger and thumb of one hand, while he presses the hernia with the other.

Treatment.
Taxis.

In very large, flat, and spreading hernia, when the tumor cannot be grasped by the hands, the surgeon should make pressure by means of some broad surface, as the bottom of a wooden platter, which he should place on the surface of the swelling, and keep up

In very
large
herniæ.

a steady pressure upon it for twenty minutes or half an hour.

General
treatment.

Should the employment of the taxis fail in relieving the patient, the other means recommended for the femoral and inguinal herniæ, under similar circumstances, should be tried; but the remedy which I have found most successful in this disease, and on which I place the greatest reliance, is the tobacco glyster, as it appears to produce much more beneficial effects in this form of hernia, than in the others I have described. It should be used of the same strength, and with the same precautions I have before mentioned. In many instances I have known this remedy successful, after repeated trials of other means had failed to relieve the patient.

Bleeding, and the application of cold, I have known to produce the desired effect after the taxis had failed; but the surgeon must be careful how he takes away blood, as women of delicate constitution, and lax fibre, are often the subjects of this disease, in whom the loss of blood, in large quantity, might prove destructive.

Should the strangulation continue in spite of these trials to relieve it, the surgeon should proceed to liberate the hernia by an operation, the performance of which is extremely simple, but requires a little caution.

The patient being placed upon a table of convenient height, in an easy position, with the abdominal muscles relaxed, the surgeon should commence the operation by making an incision across the swelling, and then a second cut at right angles with the first, in the direction of the linea alba; the transverse incision should be below, and should be joined at its centre by the lower part of the perpendicular cut, so that the two represent an inverted **L**.

The two angles should be dissected up to expose the superficial fascia, which the surgeon must next divide, but very carefully, as the hernial sac itself is sometimes wanting in part; and in such a case the protruded viscera would be immediately exposed. This covering should therefore be opened, as if it were the sac, by nipping up a small portion between the finger and thumb, in the manner I have already described.

If the peritoneal covering be complete beneath the superficial fascia, it should be cut into, and divided further, upon a director, in the same way as when operating for other herniæ. The escape of a small quantity of fluid usually indicates that the sac has been opened.

The protruded viscera being exposed, the operator should carefully pass his finger over

Operation.

Hernial sac.

Division of
the stric-
ture.

their upper part to the opening of the umbilicus, and then introducing the hernia knife upon his finger, and insinuating it under the stricture, he should cut upwards towards the ensiform cartilage to such an extent as will make the opening sufficiently large to allow of an easy reduction of the protruded parts.

Return of
viscera.

Having divided the stricture, the intestine, if in a fit state, should be first cautiously returned; and the omentum, if in large quantity, or if in a doubtful state, may be cut away, but if in a small quantity, and sound, it may be returned into the abdomen.

After-
treatment.

The edges of the external round should be brought together by sutures, and the approximation completed by strips of adhesive plaister; a compress of linen should be placed over this, and confined by means of a broad bandage passed round the body.

It is of much importance, after this operation, to procure a closure of the wound by adhesion, as the direct communication with the abdomen increases the risk of peritoneal inflammation.

Operation
for large
herniæ.

For very large umbilical herniæ, when strangulated, I should recommend a different mode of operating, which should be performed in the following manner. A small opening should be made over the neck of

the swelling, through the integument and superficial fascia, so as to expose the hernial sac at that part; then the operator should pass his finger between the sac and edge of the umbilical opening, so as to guide the hernial knife, by which the umbilical opening should be dilated upwards without dividing the sac.

I performed this operation upon a Mrs. Aaron, who had long been afflicted with a large irreducible umbilical hernia, which became strangulated. When I had divided the tendon, I was able, by very slight pressure, to return a portion of the protruded intestine, and she rapidly recovered.

Case.

In some cases the intestine adheres so firmly to the mouth of the sac, that great care is requisite to avoid wounding it. The separation of these adhesions in part must be effected with as little violence as possible, by means of the finger, to allow of the safe division of the stricture.

Adhesions.

In some instances, where there has been an opening formed by absorption, or laceration of the hernial sac, the intestine, or omentum escape from the sac through the aperture, and become strangulated by the pressure from its edge. In these cases there is considerable danger, unless the operation be very carefully performed, as the viscera

Strangulation from opening in the sac.

are exposed immediately the superficial fascia is divided.

Should the adhesions be extensive and firm, the surgeon must be content with liberating the stricture, and not attempt to return the protruded viscera.

Part of the
colon pro-
truded.

The intestine generally protruded in umbilical hernia, is a portion of the colon; the appendices epiploicæ of which become more quickly altered than the intestine itself; and if much changed, they should be cut off rather than any risk incurred by leaving them to slough after the operation.

Danger of
the opera-
tion.

The danger in this operation is of wounding the intestine, as there is not any vessel of importance that can be injured.

Of Ventral Hernia.

Like the
umbilical.

This hernia only differs from the umbilical in its seat, which is usually at the linea alba, or linea semilunaris; but any visceral protrusion at the anterior, or lateral parts of the abdomen, except those already described, may be called ventral herniæ.

Symptoms.

The symptoms of this form of hernia are usually the same as those of the umbilical, excepting when the hernia is formed between the umbilicus and ensiform cartilage

in the linea alba, and contains a portion of the stomach, when peculiar symptoms will arise.

I once saw a gentleman with a hernia in this situation, who suffered constantly from indigestion, flatulency, and a distressing sensation of sinking at the scrobiculus cordis. His hernia was, however, reducible, and the application of a truss relieved all his unpleasant symptoms. Case.

The following causes may give rise to this hernia:— Causes.

1. A natural deficiency of tendinous structure, which I have known to a very considerable extent, in the linea alba or linea semilunaris.

2. The apertures for the passage of blood-vessels being unusually large.

3. Injuries by which the continuity of the parietes is destroyed.

The coverings of ventral hernia are generally the same as those of the umbilical disease; viz. the integument, superficial fascia, and peritoneal sac; but in some instances I have found another covering connected with the edge of the opening in the tendon through which the hernia escapes. Coverings.

When this hernia occurs in consequence of wound, the coverings must, of course, vary.

Of the Reducible Ventral Hernia.

Truss. When seated in the linea alba, a truss, similar to that employed for umbilical hernia, should be worn; but, when low down in the linea semilunaris, the truss applied should resemble that recommended for inguinal hernia, only that the pad must be turned somewhat upwards.

When irreducible, the same form of truss, with a hollow pad, will be required.

Of Strangulated Ventral Hernia.

Symptoms. The symptoms indicating strangulation of this hernia are, in every respect, similar to those already described, as occurring when umbilical hernia is in the same state; and the means which should be tried, with a view of relieving the patient, should be of a like nature.

Treatment. As in the umbilical disease, the tobacco enema has here a more powerful effect than in the inguinal or femoral herniæ.

Taxis. In employing the taxis, the pressure should be made a little upwards as well as inwards, for the swelling, like the umbi-

lical, has the greater part situated below the opening from the abdomen.

If an operation becomes necessary for the relief of the patient, it should be performed in the same mode as that described for umbilical hernia; but when the disease is seated low down in the linea semilunaris, the surgeon must bear in mind the course of the epigastric artery, and divide the stricture so as to avoid it. Operation.

In very large ventral herniæ, the operation I have mentioned before, of merely exposing the neck of the sac, and dividing the stricture, without opening the sac itself, may be adopted with advantage. For large herniæ.

In the after-treatment of these cases, nothing of importance is necessary beyond what I have already recommended for the other forms of herniæ. After-treatment.

Of the Thyroideal Hernia, or Hernia Foraminis Ovalis.

The first example of this disease which I saw, was accidentally discovered in a male subject, in whom an inguinal hernia also existed on the same side. The parts are preserved in the Collection at St. Thomas's Hospital.

Course.

The hernia was protruded through the opening in the ligament of the foramen ovale, by which the obturator artery and nerve pass to the thigh; the pubes was immediately before the neck of the sac, and the ligament of the foramen embraced the other portion about three-fourths. The obturator vessels were situated behind, and somewhat to the inner side of the neck of the sac. The sac itself, not larger than a nutmeg, was placed under the heads of the pectineus and adductor brevis muscles.

Two herniæ in the same person.

I lately had an opportunity of seeing two specimens of this hernia in the same subject, one existing on each side, which were not discovered during life.

Several cases of this form of hernia are related in the first volume of the Memoirs of the Royal Academy of Surgeons at Paris.

Operation difficult.

The depth at which this hernia is situated, would render an operation, in case of strangulation, extremely difficult; but, should such a step be necessary, I should recommend the division of the stricture inwards on account of the obturator artery, &c.

Treatment.

If reducible, a truss, similar to that used for crural hernia, but with a thicker pad, would prevent its further descent.

Of the Pudendal Hernia.

This hernia appears in the external labium pudendi, about its middle. Its seat.

It commences at the side of the vagina, and passes into the labium between the vagina and ischium; it has usually a pyramidal figure, and presents the characters of other herniæ, as elasticity, dilatation on coughing; also appearing in the erect, and disappearing when the patient is recumbent. Course.

The situation of the swelling, and its want of connection with the abdominal ring, sufficiently distinguish it from inguinal hernia, which also appears in the labium, but at the upper part.

The increase of this disease may be prevented by the patient's constantly wearing a bandage to support the part; but a partial protrusion cannot readily be checked, as from its situation, a pessary, unless of very large size, would not be of any service. Treatment.

When strangulated, the usual remedies before mentioned should be tried; and, if an operation becomes necessary, the sac should be carefully opened, and the stricture divided inwards towards the vagina, the bladder being previously emptied. When
strangulated.

Of the Vaginal Hernia.

Its seat. This hernia protrudes between the uterus and rectum, where the peritoneum is reflected from one viscus to the other, at the posterior part of the vagina; sometimes, however, it appears at one side instead of the posterior part. It is only covered by the lining membrane of the vagina.

Treatment. The use of a pessary will prevent the protrusion of this disease.

Of the Perineal Hernia.

Its seat. In the male, this hernia protrudes between the bladder and rectum; and, in the female, between the rectum and vagina.

Case. I have only seen one instance of this disease, which was in the body of a male brought into the dissecting room.

Dissection. The reflected portion of peritoneum between the bladder and rectum, was protruded as far as the perineum, but no external tumor was perceptible; Mr. Cutcliffe, surgeon, at Barnstaple, has the parts preserved.

Anterior to the sac were seated part of the bladder, the prostrate gland and termi-

nations of the vesiculæ seminales; behind was the rectum, and the mouth of the sac was about two inches and a half from the anus.

The following curious case is taken from Mr. Bromfield's Chirurgical Observations :—

“A lad, between six and seven years of Case. age, was put under my care to be cut for the stone. The staff, in the attempt to introduce it into the bladder, met with resistance from a stone, which seemed to be lodged in the membranous part of the urethra, or a little lower down in the neck of the bladder. I made my incision, as usual, through the integument and muscles, to get at the groove of the staff; and then pressed the blade of my knife into the sulcus, at the extremity of the staff, being able to divide only the membranous part of the urethra; and a very small portion, if any, of the prostrate gland; by the examination of the parts, with my fingers, I then found that this hard body was a process continued from the body of the stone contained in the bladder; I therefore took the double gorgeret, without the cutting blade affixed, intending only to push back the stone, and dilate the neck of the bladder, which I did by getting the beak of the gorgeret into the sulcus of the staff, and pressing it against the point of the stone,

following its course with the instrument as the stone retired : but the direction that the gorgeret took alarmed me, as it passed under the ossa pubis with great obliquity. I then concluded that the instrument had taken a wrong route, as I could not, in this case, have the advantage of the groove of the staff farther than the extremity of the membranous part of the urethra ; but, on withdrawing the upper part of the gorgeret, I introduced the fore-finger of my right hand into the bladder, by the under part of the instrument, which remained in the bladder, and was now no more than the common gorgeret ; by which I was soon convinced that it was in the bladder, the situation of which was raised much higher in the pelvis than usual. I then introduced my forceps, and, while I was searching for the stone, a thin diaphanous vesicle, like an hydatid, appeared rather below my forceps, which, in the child's screaming, soon burst, discharged a clear water, as if forced from a syringe ; the next scream brought down a large quantity of small intestines. I need not say, that this was sufficient to embarrass a much better operator than myself ; however, I proceeded in the operation with the greatest tranquillity, being convinced, that this very extraordinary event was not owing to any error in the

operation : but the difficulty was to keep the intestine out of the cheeks of the forceps, when I should again attempt to lay hold of the stone ; the extraction of which would be very difficult to effect, from the unusual situation of the bladder in this subject. The lower part of the gorgeret remaining in the bladder, the forceps were again easily introduced, which being done with the fingers of my right hand, I pressed back the intestines, while I laid hold of the stone ; but during the extraction the intestines were again pushed out by the child's screaming : nevertheless, as I had the stone secure in my forceps, I proceeded to extract it, which I did very easily. Before I introduced the common gorgeret for the introduction of the forceps the next time, I got up the intestines again, and desired my assistant to keep them up till I got hold of a second stone, which, from its shape, appeared to be that which had got into the neck of the bladder. As soon as I was convinced by the examination, with my finger, that the bladder was freed totally from any pieces of stone, I again returned the intestines into the pelvis, and brought the child's thighs close together ; a piece of dry lint was applied on the wound, and a pledget of digestive over it ; he was then sent to bed, with no hope of his sur-

viving till the next day; but, contrary to expectation, the child had a very good night, and was perfectly well in little more than a fortnight, without one alarming symptom during the process of cure; neither did the intestines once descend through the ruptured peritoneum after they had been returned when the operation was finished."

The following are Mr. Bromfield's ideas of the nature of this case:—

"After the incision of the integument and muscles was made, as usual, there soon appeared in the wound something like an hydatid, which proved afterwards to be that part of the peritoneum which is extended from the left side of the bladder and intestine rectum to its attachment on the inside of the left os innominatum; preventing the intestines from falling down too low into the pelvis; therefore, in this case, this expansion of the peritoneum must have been forced out of its usual situation.

"Suffering daily more and more extension, it will at length permit the intestines to fall down to the very bottom of the pelvis, between the bladder and the rectum; therefore, when in the case above related, the resistance of the integument and muscles was taken off by the operation, the peritoneum was forced out, and at first was filled

only with lymph, which gave it the appearance of an hydatid; but its thinness not being able to resist any longer the force of the abdominal muscles, pressing the viscera downwards, it burst, and the intestines soon followed through the aperture. If this is allowed, we can easily account for the oblique course that the gorgeret took when first introduced, as the intestines had raised up the fundus of the bladder against the back part of the ossa pubis, so that my forceps could not be conveyed into the bladder, but almost in a perpendicular direction; and I was obliged to press with my hand on the lower part of the abdomen, just above the pubes, to bring the bladder and its contents sufficiently low for the laying hold of the last stone with my forceps."

Scarpa met with a case in which this hernia formed a tumor in the perineum.

This form of hernia, and the vaginal, may become dangerous during gestation, and some cases illustrating this are related in Dr. Smellie's cases on midwifery.

Of the Ischiatic Hernia.

This is an extremely rare form of hernia; Very rare. indeed, I have only seen one specimen of it,

for which I am indebted to my friend Dr. Jones, whose name is well known by his excellent work on hæmorrhage.

Case. Dr. Jones having told me that he had inspected the body of a patient who had died in consequence of the strangulation of a portion of intestine in the ischiatic notch, I became very anxious to obtain the parts; and, after considerable difficulty, we obtained permission to open the body a second time, when I removed the hernia and surrounding parts.

Dr. Jones had been requested to visit the patient, a young man, about twenty-seven years of age, in consequence of his suffering from symptoms which resembled those produced by strangulated hernia. The patient stated that he had experienced a similar attack before, which had been relieved by opium, followed by a dose of castor oil. Dr. Jones, therefore, gave him some opium, and directed that he should take some pills composed of calomel and scammony, as soon as the stomach appeared tranquil.

On the day following, Dr. Jones found that the patient had experienced relief for a short period after taking the opium, but that the pills had been thrown up, and no evacuation had taken place from the bowels. The patient was also much troubled by eruc-

tations and flatulence, for which he took some spir: ammoniæ comp: and spirit: lavendulæ, with good effect.

Dr. Jones, feeling confident that the symptoms were produced in consequence of the strangulation of some portion of the intestines, now examined the man carefully; but could not detect any protrusion; nor did the patient complain of any local pain, which could induce Dr. Jones to inspect the ischiatic notch.

As no stools had been procured, some purgative glysters were thrown up, but without producing the desired effect. Other purgatives were subsequently given, and glysters were again thrown up, but without affording relief; also leeches and blisters were employed, but they produced only temporary benefit. On the sixth day from the commencement of these symptoms, they suddenly subsided, excepting that no evacuation from the bowels took place; and the patient felt himself so well, that he was desirous of going to business; but Dr. Jones advised him to remain quiet for some days. Early on the morning of the seventh day the patient got up, and went down from his bed-room, which was in the fourth story, to the ground floor, but he soon returned, complaining of being very unwell; after

which he gradually sunk, and expired on the same evening.

Dissection. On examining the body after death, a portion of the ilium was discovered passing by the right side of the rectum to the ischiatic notch, through which a fold of the intestine was protruded into a small hernial sac, to the inner surface of which the intestine was adherent. The strangulated part of the gut, and about three inches of it on each side of the stricture, was very much discoloured. The intestines between the stomach and protruded portion were distended with air, and had a few livid spots upon them. The intestines from the stricture to the rectum were very much contracted, particularly the arch of the colon.

On carefully dissecting the parts after I had removed them from the body, I found a small orifice in the pelvis, anterior to, but a little above the sciatic nerve, and on the fore part of the pyriformis muscles. This opening led to the hernial sac, which was situated under the gluteus maximus muscle, and in which the intestine had been strangulated.

The orifice of this hernial sac was placed anterior to the internal iliac artery and vein, below the obturator artery, and above the obturator vein; its neck was seated before

the sciatic nerve, and its fundus was covered by the gluteus maximus muscle. Below the fundus was the sciatic nerve, and behind it the gluteal artery; above, it was placed near the bone.

Should the existence of such a hernia be ascertained, it might, if reducible, be prevented from protruding by the application of a spring truss; but, should it become strangulated, and an operation be deemed advisable, I should recommend the division of the stricture to be made directly forwards. Treatment.

Of the Phrenic Hernia.

Protrusions of the abdominal viscera through the diaphragm, may take place either at the natural apertures framed for the passage of the œsophagus, vena cava, aorta, &c., or through unnatural openings, the consequence of malformation or injury. Its seat.

When this hernia exists, the patient suffers much from interrupted respiration and cough, besides experiencing the symptoms of hernia already enumerated. Symptoms.

This hernia has, or has not a proper sac, according to the circumstances of its formation; when protruded through one of the natural apertures, it has a proper sac; when Hernial sac.

occurring from malformation, it sometimes has a peritoneal covering, and sometimes this covering is wanting; when the consequence of laceration or injury, the hernial sac is always deficient.

Case. I have never seen an hernia protruding through any of the natural openings of the diaphragm; but several cases are related by Morgagni, in which this form of hernia existed. He mentions the case of a young man who was attacked with symptoms of acute cardialgia and constant vomiting, under which he expired. On examining his body after death, the omentum, with part of the colon, the duodenum, some portion of the jejunum and ilium were found in the cavity of the thorax, having passed through the same opening by which the œsophagus descends; the lungs and the heart were compressed into a very small space.

**From mal-
formation.**

The occurrence of phrenic hernia from malformation is not very uncommon. There are two preparations in the Museum at St. Thomas's Hospital exhibiting this disease. In one instance the opening is of sufficient size to admit nearly the whole of the small intestines through it; in the other specimen the large portion of the stomach was protruded through a much smaller aperture.

In both cases the unnatural openings are in the left muscular portion of the diaphragm.

Some cases of this form of the disease are also related in the first volume of *Medical Observations and Inquiries*, by Dr. G. Macauley.

When the unnatural aperture is small, the patient suffers frequently from the usual symptoms of hernia, and is in danger of being destroyed by a strangulation of the protruded parts as in other hernia. Danger.

In the year 1798, I published the history of an interesting case of this description, which I shall take the liberty of relating here.

Sarah Homan, æt. twenty-eight, had, from her childhood, been afflicted with oppression in breathing. As she advanced in years, the least hurry in exercise, or exertion of strength, produced pain in her left side, a frequent cough, and very laborious respiration. Case.

These symptoms were unaccompanied with any other marks of disease; and, as her appetite was good, she grew fat, and, to common observation, appeared healthy. The family with whom she lived suspected her of indolence, and her complaints being considered as a pretext for the non-performance of her duty, she was forced to undertake employments of the most laborious kind.

This treatment she supported with patience, though often ready to sink under its consequences. After any great exertion, she was frequently attacked with pain in the upper part of the abdomen, with vomiting, and a sensation, as she expressed it, of something dragging to the right side; which sensation she always referred to the region of the stomach.

The cessation of these symptoms used to be sudden, as their accession. After suffering severely, for a short time, all the pain and sickness ceased, and allowed her to resume her usual employments.

As her age increased, she became more liable to a repetition of these attacks; and, as they were also of longer continuance than in the early part of life, she was at length rendered incapable of labouring for her support.

Some days previous to her death, she was seized with the usual symptoms of strangulated hernia; viz. frequent vomitings, costiveness, and pain; the pain was confined to the upper part of the abdomen, which was tense and sore when pressed.

As these symptoms were unaccompanied with any local swelling which indicated the existence of hernia, they were supposed to be produced by an inflammation of the in-

testines; but there were other symptoms that could not be attributed to this cause, which occasioned much obscurity with respect to the true nature of the complaint, and seemed to indicate a disease in the thorax. She was unable to lie on her right side, had a constant pain in the left, a cough, difficulty of breathing, attended with the same dragging sensation of which she had formerly complained.

The signs of inflammation of the intestines, with the addition of a troublesome cough, continued without abatement for three days, when she expressed herself better in these respects; but the morbid symptom in the thorax remained as violent as at first; and in the fourth day from their commencement she expired.

On examining the body after death, when the abdomen was opened, there appeared a very unusual disposition of the viscera. The stomach, and left lobe of the liver, were thrust from their natural situation towards the right side. On tracing the convolutions of the small intestines, they were found to retain their usual situation; but lines of inflammation extended along such of their surfaces as lay in contact. This appearance the adhesive inflammation assumes in its early stage; and it is highly probable, that,

Dissection.

if the approach of death had been less rapid, these surfaces of the intestines would have been glued together by the effusion of coagulated lymph.

When the large intestines were examined, the great arch of the colon, instead of being stretched from one kidney to the other, was discovered to have escaped into the left cavity of the chest, through an aperture in the diaphragm. The cœcum and beginning of the colon were much distended with air, and appeared therefore larger than natural; but the colon, on the left side, as it descended toward the rectum, was smaller than it is commonly found.

A small part only of the omentum could be discovered in the cavity of the abdomen, a considerable portion of it having been protruded into the chest; through the same opening by which the arch of the colon had passed. The displacement of the stomach, and left lobe of the liver, had arisen from the altered position of the colon and omentum; which, in their preternatural course towards the diaphragm, occupied the situation of each of these parts.

When the chest was examined, the left lung did not appear of more than one third of its natural size; it was placed at the upper part of the thorax, and was united to the

pleura costalis by recent adhesions. The protruded omentum and colon were found at the lower part of the left cavity of the chest, between the lung and the diaphragm, floating in a pint of bloody-coloured serum. The colon, in colour, was darker than usual; in texture, softer, and distended with feculent matter mixed with a brownish mucus. The portion of the intestine contained within the chest measured eleven inches. The omentum was also slightly altered in colour, being rather darker than natural; but, in other respects, this viscus was not changed; it adhered firmly to the edge of the aperture, and more than half of its substance was contained within the chest.

The opening through which these viscera had protruded, was placed in the muscular part of the diaphragm, three inches from the œsophagus; it was of a circular figure, and two inches in diameter; its edge was smooth, but thicker than the other parts of the muscle.

The peritoneum terminated abruptly at the edge of this aperture, so that the protruding parts were not contained in a sac, as in cases of common hernia, but floated loosely, and without a covering in the cavity of the chest, of which they occupied so large a space, as to occasion considerable pressure on the left

lung, and to produce the diminution I have before remarked.

The right side of the chest, also the right lung and the heart, were free from disease.

Could the precise nature of this disease be ascertained during the life of the patient, but little could be done for his relief; no more, than, perhaps, his own feelings would dictate, the refraining from all kinds of bodily exertion.

From laceration.

The third cause of this form of hernia is wound, or laceration of the diaphragm, and the former inflicted with the small sword, has been the most frequent. The opening is at first prevented from closing, by the pressure of the abdominal viscera, which frequently protrude through it, in small quantity at first; but at length, should the patient survive, very large portions escape.

The only instance in which I have known this disease produced by accident, has been from laceration of the diaphragm, in consequence of the fracture of several of the ribs.

Case.

William Rattley, aged thirty, was admitted into Guy's Hospital. About one o'clock on February 5, 1804, having fallen from the height of about thirty-six feet, by which six of the lower ribs on the right side were fractured. When admitted, he breathed with great difficulty, and complained of excessive

pain; the crepitus from the fractured ribs could be distinctly felt, and there was slight emphysema. Soon after his admission, he vomited violently, had frequent hiccough, and expired about eight o'clock on the following morning.

The following appearances presented themselves on inspecting the body after death. Dissection.
 A small wound at the inferior and posterior part of the right lung, with some slight but recent adhesions between the two portions of pleura. On pressing down the diaphragm, a portion of intestine was discovered, in the cavity of the chest on the right side, of a livid colour. On examining the cavity of the abdomen, this fold of intestine proved to be a part of the ilium, which passed upwards behind the liver, through the lacerated opening in the diaphragm, into the chest. The aperture in the diaphragm was situated about two inches from the cordiform tendon on the right side, in the muscular structure; it was filled by the intestine, which was confined by a firm stricture. The laceration had been occasioned by the fractured end of the tenth rib. The other viscera of the abdomen were otherwise but little altered; but near a quart of bloody serum was extravasated into the cavities of the chest and abdomen.

Of the Mesenteric Hernia.

Cause. This hernia occurs in consequence of a natural deficiency of one of the layers composing the mesentery, or from an accidental aperture being made.

Formation. The intestines force themselves into such an opening, and, quitting the proper cavity of the peritoneum, form a hernia, which may become of very large size, as the cellular union of the two layers is not sufficiently firm to offer much resistance to the pressure of the protruding viscera.

Case. Mr. Pugh, of Gracechurch Street, afforded me an opportunity of examining a hernia of this kind. The subject in which it was found, had been brought for dissection to St. Thomas's Hospital; and the man had been a patient under Mr. Forster, in Guy's Hospital, just previous to his death.

Appearances. On opening the abdomen, and raising the omentum and colon, the small intestines were not to be seen, but a large swelling was discovered, situated over the lumbar vertebræ, and reaching to the basis of the sacrum; which, on further examination, proved to be a sac of peritoneum, containing the small intestines, and surrounding them completely, excepting at the posterior part, where the

aperture by which the intestines had escaped, was situated.

From what I could collect of the previous history of the patient, he did not appear to have been much inconvenienced by this unnatural position of the viscera.

Of the Mesocolic Hernia.

The formation of this hernia is similar to that last described ; and the first example I had an opportunity of examining, was, as the former, in a subject brought to the Hospital for dissection.

The abdomen having been opened, and the omentum and large intestines turned up, a tumor was discovered on the left side of the cavity, extending from over the left kidney, to the edge of the pelvic cavity, the lower portion being situated in the fold of the sigmoid flexure of the colon. The large intestines took their usual course, only that the cœcum was nearer to the centre than in common. On the left side, the colon was raised by the tumor. The duodenum, a small part of the jejunum, and termination of the ilium, were the only parts of the small intestines to be seen, on first opening the abdomen, all the rest being situated in the sac, having

Appear-
ances.

protruded by an aperture on its right side, which was large enough to admit two folds of intestine in a distended state.

The sac was formed by the peritoneal layers of the mesocolon.

Dr. Jones's
case.

Dr. Jones, of Barbadoes, sent me a drawing, exhibiting the larger part of the moveable viscera, between the layers of the peritoneum, as found when examining the body of a patient he had attended.

Of Strangulation of the Intestine within the Abdomen.

This I have known to occur in several different ways.

Causes.

First. — From the intestine protruding through an aperture in the omentum, mesentery, or mesocolon.

Second. — From the same circumstance occurring when small openings are left in the adhesions formed in consequence of inflammation.

Third. — From a membranous band formed at the mouth of a hernial sac, becoming elongated, and entangling the intestine when it has been returned from the hernial sac.

Fourth. — From the appendix vermiformis entangling the intestine.

Mr. R. Croakes, surgeon, of Barnsley, in Yorkshire, sent me the account of a case in which a portion of intestine had been protruded through an opening in the omentum, and had become strangulated. The patient was eighty years of age, and had been previously very healthy and active. The case terminated fatally, two days after the commencement of the symptoms; and on examination after death, the intestine was found in a gangrenous state.. Case.

A case in which a portion of small intestine had protruded through an opening in the mesentery, and become strangulated, occurred under the care of Mr. Palmer, of Hereford. The symptoms were severe, but the patient survived until the ninth day from their commencement. Case.

Dr. Monro has related a case of this nature in his work on crural hernia.

Mr. Hodson, of Lewes, attended a young man who died in consequence of the strangulation of a fold of small intestine, which had protruded through an aperture left in an adhesion of the omentum to the peritoneum. Case.

I have a very excellent specimen, showing the strangulation of intestine by elongated membranous bands. It was taken from the body of a patient of Mr. Weston's, of Shore-ditch. The patient was eighty-five years of Case.

age, and resided in Hoxton Workhouse. He was seized with symptoms of strangulated hernia, in consequence of which Mr. Weston was sent for, who, on examining the man, found a hernia on the right side, which he soon reduced by the taxis. The symptoms, however, continued, and the patient died. On examining his body after death, I found that the intestine had been returned into the cavity of the abdomen, but that two folds of it were entangled and strangulated by a long membranous band.

Specimen
in Guy's
Museum.

In the Museum at Guy's Hospital is a beautiful preparation, showing a considerable portion of the small intestine, surrounded and strangulated by the appendix vermiformis; but I am not acquainted with the history of the patient from whom it was taken.

As the precise nature of any of the above cases could not be ascertained during the lives of the patients, no benefit could be derived from surgical aid.

LECTURE XXXVI.

On Wounds.

SOLUTIONS of continuity on the surface of the body are of four kinds, according to the manner in which they are produced; viz. Incised, Lacerated, Contused, and Punctured. Of four kinds.

Incised, when produced by a cutting instrument; lacerated, when the parts are forcibly rent asunder; contused, when occasioned by some heavy body, or one passing with great velocity; and, punctured, if made by a pointed substance.

This division of wounds is attended with advantage in the description of their treatment, as it must in some degree vary from the mode of their production.

Of the Incised Wound.

The lips of the divided parts are more or less separated according to the extent of the injury; and, the division of the muscles, which, by their contraction, lead to Character.

a gaping state of the wound, as in the cheek, the lips, or in transverse incisions in the limbs.

The wound is covered with blood, which is florid or purple, as an artery or vein has been injured. If an artery, the blood flows by jets rapidly, and is of a florid colour; if a vein, the bleeding is slow, gradually filling the wound, and the blood is of a purple colour. Fainting is produced if an artery be cut, but rarely, if the bleeding be venous. Fainting also results if the wound extends to parts of vital importance, even although the hæmorrhage be very slight.

Treatment.

When you are called to a case of incised wound, you are to make pressure upon its surface with a sponge to arrest the hæmorrhage, and if the divided vessels be small, you will soon find it subside under a steady and continued pressure. But if an artery of any magnitude has been injured, it should be drawn from the surrounding parts by a pair of forceps, or raised by a tenaculum, and then tied with a very fine ligature; one end of which should afterwards be cut off, that no more space than is absolutely necessary may be occupied by the thread or silk.

So soon as the bleeding ceases, the coagulated blood is to be completely sponged away from the surface and edges of the wound,

the edges are to be brought together, and a strip of lint or linen moistened with the blood, is to be placed on the part in the direction of the wound, when the blood, by coagulating, glues the edges together in the most efficient and natural manner; adhesive plaister is to be applied over the lint with spaces between to allow of the escape of blood or serum.

In a few hours, inflammation arises, and fibrin becomes effused upon the surfaces and edges of the wound, by which they become cemented.

How
closed.

In a few days, vessels shoot into the fibrin, effused by the inflammation; and it becomes organized with arteries and veins, and after a time, with absorbents and nerves; thus the structure of the part is restored.

Organized.

If the wound be in a muscular part, more especially in transverse wounds of muscles, it is required that the position of the limb be carefully attended to, that the wounded muscle may be relaxed as much as possible, and its separated portions approximated. Thus, if the biceps muscle were divided in the arm, the limb must be bent at right angles; and if the triceps be injured, extension will be necessary.

Wound of
muscle.

But if the wound has happened in a muscular part, which is not supported, as in the

Sutures
required.

cheek, a suture is required to preserve approximation; the thread employed should be as fine as possible, and only as many as are absolutely necessary, to produce the desired effect, should be inserted.

If a wound be angular, and of considerable extent, a suture at the angle is desirable, or the edges will seldom be returned in their proper situation.

Not injurious.

It is quite a mistake to suppose that sutures are injurious, and that they should be never used; for a wound often heals better with a suture and a cooling lotion, than with adhesive plaister. Indeed, adhesive plaister should not be applied to the edges of wounds. Often have I seen it produce erysipelas, and sometimes the erysipelas followed by the death of the patient. After the removal of a large tumor from the breast, I often employ a suture to keep the parts in exact contact, and to prevent the edges from becoming inverted.

Reproduction of parts.

When the wound is healed, the parts wounded are generally reproduced. The cutis, and cuticle, easily; the rete mucosum, more slowly. The cellular membrane is for sometime indurated, and requires the use and motion of the parts, to be completely evolved.

A number of branches of arteries and

veins are formed instead of the original trunks. Nerves are reproduced. Tendons are also again formed. Bones are united by bone.

But some parts are not reproduced. There is a specimen in the Collection at St. Thomas's Hospital, in which a wound of a muscle is seen united by a tendinous structure. There is also a specimen of a cartilage of a rib united by bone, but in young persons cartilage is reproduced.

Muscle
not repro-
duced.

Parts which are nearly separated readily unite, as the finger or the nose when it has been cut, or torn, and a suture is required to aid its union.

Parts
nearly se-
parated
unite
readily.

Parts entirely separated in other animals sometimes unite. Mr. Hunter removed the spur of a cock, and placed it in the comb by incision, where it not only adhered, but grew. He also removed the testis of a cock, and placed it in the belly of a hen, where it adhered. A tooth extracted from the human subject, and placed in the comb of a cock, adheres there.

Parts
entirely
separated
will unite.

The only instance in which I have seen a part removed entirely, and afterwards adhere, was in the following case:—

I amputated a thumb for a patient in Guy's Hospital; and, finding that I had not preserved a sufficient quantity of skin to cover

the stump, I cut out a piece from the thumb which I had removed, and applied it upon the stump, confining it by stripes of adhesive plaister. On taking off the dressings a few days after the operation, I found, that the portion which had been completely separated, and afterwards placed upon the stump, was firmly united and organized.

The most extraordinary instance of the union of a separated part has been related by Dr. Balfour, in the *Edinburgh Medical and Surgical Journal*, for October, 1814, from which the following account is taken:—

Case. “On the 10th of June last, two men came to my shop about eleven o’clock in the forenoon; one of whom, George Pedie, a house carpenter, had a handkerchief wrapped round his left hand, from which the blood was slowly dropping. Upon uncovering the hand, I found one half of the index finger wanting. I asked him what had become of the amputated part. He told me that he had never looked after it, but believed that it would be found where the accident happened. I immediately dispatched his companion to look for it, and to bring it to me directly he found it. During his absence I examined the wound, which began near the upper end of the second phalanx on the thumb side, and terminated about the third phalanx on the other

side. The wound which had been inflicted with a hatchet was quite clean.

“In about five minutes, the piece of the finger was brought; it was quite cold, and white in appearance, like a bit of a candle. I immediately exposed both surfaces to a stream of cold water, to wash the blood off the one, and any dirt that might adhere from the other. I then applied, with as much accuracy as possible, the wounded surfaces to each other, expressing a confident opinion, that reunion would take place.

“I endeavoured to inspire the patient with the same hopes, but he did not appear convinced of the possibility of such an occurrence. I informed him, that, unless pain or fœtor, or both, should occur, I would not remove the dressings for a week at least. I directed him to keep his arm in a sling, and not to attempt any kind of work; to which he promised obedience. He called on me the next day, when he was quite easy, but the wound had bled a little. Although he promised to call on me daily, I did not see him again till the fourth of July. I had concluded that he had applied to some other practitioner; but, on the second of July, a gentleman called on me, and gave me the following account of the patient:—

“Two days after the accident, the patient,

under the influence of the ridicule of his acquaintance, for giving credit to my assurances, applied to another practitioner; who, on learning the history of the case, represented the impropriety of any one but myself intermeddling with it. But, prepossessed with the belief that he carried about a portion of dead matter tied to the stump of his finger, the man insisted upon having the bandages removed, which was accordingly done. Thus were nearly rendered abortive my attempts to produce reunion of the parts, and the profession deprived of a fact, which, as demonstrating the powers of nature to repair injuries, is inferior to none in the annals of the healing art. Fortunately, however, nature had been too busy for even this early interference to defeat her purpose,—adhesion had taken place.

“In consequence of the information I got from this gentleman, I found out the patient on the fourth, when reunion of the parts was complete. The finger was in fact the handsomest the man had, and had recovered both heat and sensation. In the progress of the cure, the skin was changed, and soon after the accident the nail fell off.

“From the account of persons present when the injury was inflicted, I am satisfied that twenty minutes must have elapsed before

the parts were replaced ; for the patient did not come to me immediately upon receiving the injury, but waited a considerable time in the building where the accident happened.

“The amputated part, as measured by the patient himself, was one inch and a half long, on the thumb side, and one inch on the opposite side.”

When adhesion of the incised wounds can be completely effected, the danger ceases. Adhesion prevents danger.
An incised wound into the abdomen, exposing its different viscera, is not followed by danger if the wound is made to unite. Wounds of the chest, even complicated with injury to the lungs, cease to be dangerous under the adhesive process. Wounds of the brain will unite by adhesion, and the patient recover.

Union by adhesion is prevented by the following circumstances in incised wounds :— Adhesion prevented.

1. By the introduction of many, and of large sutures. By sutures. It is therefore necessary to employ the finest threads, and to cut off one of their ends, that they may occupy as little space as possible ; and in, from four to six days, they should be removed ; thus they are prevented from producing suppuration and ulceration.

2. By the inflammation being suffered to By too much inflammation.

run too high from want of bleeding generally, or, locally, by leeches ; or, from not employing cooling evaporating lotions. Spirits of wine and water, or acetate of lead and water, should be applied upon the wound, and around it. Purging is also often required.

The adhesive inflammation is but a slow degree of action, and if it be not kept in bounds, suppuration will occur.

By poisons. If poisons be introduced into wounds, it will be wrong to attempt to produce adhesion ; thus the bite of a rabid animal should be excised, as well as cauterized afterwards, to prevent the terribly dangerous consequences of such an injury.

By caustics. The use of caustic applications, whether by potash, nitric acid, the actual cautery, &c. will necessarily prevent adhesions.

When an absorbent is divided. When many absorbent vessels are divided, the lymph poured out by them prevents adhesion, as I have seen in a transverse wound in the groin.

Or a secretory gland. When the secretory glands are wounded, their secretion prevents union.

Case. I was called to a gentleman who fell upon his face on an earthen plate, which he broke ; his face was dreadfully wounded ; I brought the parts together, and in ten days they appeared to be united, when I allowed him to eat ; but the result was a profuse discharge

of saliva from the wound, which was a very long time in healing, on account of the paroted duct having been cut across.

Union by adhesion, is often frustrated by the surgeon's impatience; he is anxious to see if union be effected or not, and most absurdly and mischievously raises the dressings, disturbing, and often breaking, the adhesions, and thus rendering the process of granulation necessary, when it might have been avoided.

By the surgeon's imprudence.

The adhesive inflammation is often prevented by the state of the constitution; if the patient be much out of health, or if he be extremely irritable, the inflammation will proceed beyond the bounds of adhesion, and suppuration will take place. In such persons, evaporating lotions to the wound, and opium internally, are the means of arresting the mischief which will otherwise ensue.

By state of constitution.

It is not always an object to endeavour to produce adhesion; when there is much loss of substance, and the parts must be forcibly drawn together, much additional pain and irritation are occasioned by the attempt at adhesive union, and this is more especially the case in children, when the skin cannot well bear the application of the adhesive plaister. I therefore, when I remove those marks which are called *nevi materni*, I do

Adhesion not always desirable.

not attempt to bring the edges of the wound together; but only, after the bleeding has ceased, apply lint for twenty-four hours, and then a poultice to the part by which much pain and irritation are avoided. The breast I often dress in the same manner, after the removal of tumors connected with much disease of the integument.

Of Lacerated Wounds.

Character. These wounds bleed much less than the incised, for a reason which will be described when we speak of wounds of arteries; but here it is sufficient to say, that the largest arteries of limbs may be torn through without any dangerous bleeding occurring.

Differ from incised. Lacerated wounds also differ from incised, in their often containing extraneous bodies. Those of the scalp are frequently filled with dirt, from the head ploughing the ground, and the utmost care is required to cleanse them with warm water, and to remove with a sponge all extraneous matter, as I have seen such a wound adhere, and afterwards suppurate in various places, for the discharge of the foreign bodies which the adhesive matter had at first confined.

Lacerated wounds are more disposed to inflame, than the incised, and they require much more attention to the use of evaporating lotions, and of leeches to suppress it. More disposed to inflame.

The nervous system frequently suffers severely from lacerated wounds. Spasms of the limbs, and tetanus, I have often seen follow these lacerations on the head. Affect the nervous system.

I was sent for to see a young gentleman at Marlow, who had fallen into a hedge and torn his hand with a thorn bush; he died from tetanus. In the hospitals, from lacerated wounds of the fingers, made by machines for combing wool, I have several times known tetanus produced; the tendons and fascia in these cases had been much exposed and injured. Case.

Erysipelas is not an unusual effect of lacerated wounds, more especially if they are inflicted on the scalp, and they therefore require great attention, although they at first appear of trifling importance. Produce erysipelas.

The treatment of these wounds is the same as that which has been described for incised wounds; but more care is required in the use of cooling lotions, and the application of leeches, in quiet, and in the exhibition of opium under the first appearance of spasmodic symptoms. Treatment.

Patients with lacerated wounds, should not be much reduced by depletion, as it disposes to tetanic symptoms.

LECTURE XXXVII.

Of Contused Wounds.

Character. THESE injuries differ from the incised and lacerated wounds, in being accompanied with disorganization: blood is extravasated, the cellular tissue is broken down, muscles are bruised, and many parts disorganized.

Process of reparation. The process of restoration is therefore quite different to that which takes place after incised or lacerated wounds.

Sloughing. Inflammation to a considerable extent must be produced; the dead parts must be separated by a process of ulceration, and granulations will arise to fill up the cavities occasioned by these separations. The surgeon, therefore, who treats these wounds as he would the incised or lacerated, has still to learn the fundamental principles of his profession.

Contused wounds bleed but little, from the organization of the parts being destroyed, and from the extravasation making pressure upon the vessels which are divided.

Treatment. The treatment of the contused wound in principle, consists in facilitating the separation

of the contused parts, instead of approximation, as in the incised and lacerated wounds. To effect this object, and to expedite the process, fomentation and poultices are to be used, which lessen inflammation when too violent, and hasten the suppurative and ulcerated processes. If the inflammation be still considerable, leeches should be applied; but bleeding ought not to be had recourse to from the arm, for all the powers of the constitution are required to assist in the process of separation, and of granulation.

The bowels should be kept regular; but opium should be combined with the medicines given, to effect that object. If the constitution become much debilitated, the sulphate of quinine may be given; or ammonia, combined with opium. Medicines.

When the sloughing, or separating process is completed, the fomentations and poultices are to be abandoned, and the parts may be approximated by adhesive plaister, or simple dressing be applied to the wound, treating it as a simple ulcer. Applications.

Of Punctured Wounds.

These wounds are produced by pointed bodies, as needles, scissors, hooks, points of Danger of.

broken bones, &c.; and the effects which follow them are often highly dangerous, by occasioning inflammation of the absorbents; or when tendinous structures or nerves are injured.

Of their Effects upon the Absorbents.

A slight wound through the skin into the cellular tissue, will be sometimes followed by severe pain in the part; a blush around it, and by the absorbent vessels forming red lines, from the wound to the absorbent glands, in which they terminate.

Consequences.

Of this effect I have seen very many examples, and I have been a sufferer from it myself. Abscesses sometimes form upon the absorbents, in their course to the axilla, or to the groin; and sometimes in the glands in which they terminate; and in very irritable persons death sometimes ensues; and the following example of it I had an opportunity of inspecting.

Case.

A West Indian, studying at Guy's Hospital, wounded his finger, the absorbents of his arm became inflamed, and he laboured under excessive irritative fever; the veins seemed to suffer also from inflammation communicated to them, for his limbs became almost incapable of motion, from the violent pain produced by bending any of the joints, and the super-

ficial veins of his limbs were very tender when pressed. He died in six days after the attack, and I inspected his arm. The absorbents of the limb were highly inflamed; and in the axilla matter was effused, not in a separate abscess, but in a sheet of suppuration in the cellular tissue, between and around the absorbent vessels. I was not permitted to inspect the body further.

After an inflammation of this kind in myself, Case.
produced by wounding my finger when opening the body of a man executed on the same morning; my throat became sore as the inflammation in the absorbents of my arm subsided, and one of my knees became stiff from rheumatism; when this was subdued by a blister, the other knee became similarly affected.

It would seem that under certain circumstances a poison is produced sufficiently strong to excite inflammation, even when there is no wound. Poison absorbed.

Mr. Cook, surgeon, at Marsh-gate, Westminster Bridge, sent to me whilst he was labouring under the highest irritative fever, in consequence of having opened the body of a person who had died of puerperal fever. When I examined him, I found the extremities of his finger of both hands inflamed, as if they had been dipped in scalding water, and the Case.

absorbents of his arms red, hard, and knotted, to the axilla; yet he had not any wound or abrasion of any kind upon his hands; and it would therefore seem, that the fluid produced in the abdomen of this woman, in which his fingers had been frequently immersed, was of a highly stimulating nature.

Form of
wound and
state of
constitu-
tion.

The effect of punctured wounds depends, however, very much upon the form of the wound, and the state of the constitution. When punctures have been made, by a clean needle, the tongue of a knee buckle, a fragment of bone, &c., nothing can be introduced of a poisonous nature, and the effect must depend upon the form of the wound, and the structure injured. But the effect also depends upon the state of the constitution, as is evinced in our young students suffering in the Spring, after confinement in London, in the air of our dissecting room, and in the wards of our hospitals, and by their escaping these violent symptoms in the Autumn, when they have just quitted the country.

I believe, therefore, that these effects arise from the form of the wound, and the state of the constitution; also occasionally, but rarely, from the introduction of an irritating fluid, the result of peculiar inflammation, or the production of the first stage of putrefaction.

Bites of
dogs and
cats.

I have known the bites of cats, dogs, and

rats, followed by high inflammation, and constitutional irritation, many days after the injury has been inflicted; and these cases unite the symptoms of punctured and contused wounds; the first effects upon the constitution arise from the punctures of their pointed teeth; but when the symptoms produced from this cause subside, from fifteen to twenty days after, I have known the injured parts inflame and slough; the constitution, as well as the part, undergoes great changes, and the patient becomes excessively reduced.

The treatment of punctured wounds consists in adopting the following plan:— Treatment.

First.—A lancet should be used to extend the puncture to an incision.

Second.—The surrounding parts should be pressed to remove, by the blood which issues, any extraneous matter which may have been introduced. If the finger is wounded, a piece of string or tape should be bound tightly round the injured finger, from its junction with the hand, as far as the wound, so as to force out blood from the opening.

Third.—The nitric acid, nitrate of silver, or caustic of potash, should be applied to the wound.

Fourth.—A lotion composed of the subacetate of lead; spirits of wine and water should

be applied over the part, to prevent too much action when inflammation begins.

Fifth.—Leeches should be applied, and fomentations with poultices employed, if the pain and inflammation become considerable.

Sixth.—Give calomel and opium at night, and a brisk purgative in the morning.

7th.—Let the limb be supported on an inclined plane, so that the blood shall gravitate towards the body; all stimulating food and drink should be avoided; a measure so absurd that a caution against it appears unnecessary; but an anatomist killed himself by taking wine to oppose the putrefactive influence of the matter he supposed to be absorbed.

Inflamma-
tion re-
turns.

The inflammation from punctures of the hand in dissecting, will continue a long time, and be resumed when it seems to be at an end; attention to the general health, and to the part, must be therefore regarded closely, for a considerable period after the injury.

Of Punctured Wounds of Tendinous Structure.

Danger of.

If fascia be punctured, alarming symptoms will sometimes arise, in part from the form of the wound, from the feeble power of the structure, and partly from the confinement of matter beneath the fascia.

The form of the wound produces these symptoms, because the parts are rather forcibly separated than actually divided, and consequently the adhesive process does not readily succeed. The structure of tendons and fasciæ, from their little vascular organization, and difficult restoration, leads to much constitutional effort; and the form of fascia tends to confine the pus when it is secreted.

Form of the wound.

A gentleman sat upon a rail, from which a nail projected, and it entered the middle and back part of his thigh; great irritative fever followed, with redness and swelling of the thigh; and, as fomentations and poultices, and calomel with opium, did not relieve him, I made an incision in the situation of the puncture, and found that the nail had penetrated the fascia lata; I divided it freely, when some pus, which had formed under it, was discharged. He quickly recovered.

Case.

When a puncture is made into a theca, suppuration is apt to ensue, when an early incision, by allowing the discharge of the matter, prevents the greatest mischiefs.

Early incisions.

If matter forms under the aponeurosis of the palm of the hand, an early incision is the only mode of relief, if the puncture which occasioned the suppuration is too small to admit of the escape of the pus.

Treatment. The treatment, therefore, of these wounds, consists in endeavouring to prevent suppuration by leeches, and evaporating lotions, in the first instance ; but, if matter does form, to open the abscess early, both with a view of making the punctured an incised wound, and to give a free outlet for the escape of the pus.

On the Effects of Punctured Wounds on the Nervous System.

Tetanic symptoms.

The spasmodic and tetanic symptoms, which follow punctured wounds, are the effects of injury to tendinous, rather than nervous parts. Most of the cases of tetanus which I have seen occur from punctured wounds, have been when the hand or foot has been the seat of injury ; the aponeurosis of the palm, or sole, or the tendons being hurt. I will not deny that an injury to a nerve will produce the same effect ; but I cannot help doubting its being the usual cause.

Case.

I divided the posterior tibial nerve in a Mrs. Sabine, the wife of a surgeon at Dunchurch, for a painful tumor on it ; and little constitutional irritation was produced by the operation.

I removed a tumor from the median nerve Case. of a gentleman, and cut away two-thirds of the thickness of the nerve, leaving one-third; tingling of the fingers, with some partial numbness, followed, but no constitutional irritation; and he did very well.

I cut out five-eighths of an inch of the Case. radial nerve, for aura epileptica; and no unpleasant symptom followed, but the patient got well.

Mr. Key removed a portion of the cubital Case. nerve, for aura epileptica; and, although it did not cure the woman, it produced no unfavourable symptoms.

These instances, to which many more might be added, as well as the usual seat of the wound, which produces tetanus, lead me to believe that it is rather the result of injury to tendinous than to nervous structures.

Extensive injuries, by their sympathetic influence, and by their severe shock to the nervous system, produce the destruction of life, even without vascular reaction or inflammation.

The symptoms which arise are sometimes only general spasm, sometimes trismus, and sometimes tetanus.

I once saw a boy die, in a few hours, of Case. the most violent spasms of most of the muscles of his body, from the pointed extre-

mity of a broken thigh bone having penetrated the under side of the rectus femoris.

Case. I saw a person die from spasm, produced by a punctured wound in the triangular ligament of the pubes, from a sharp piece of wood; and I have seen a great number of such cases from injury to the hand and foot.

Degree of
spasm varies.

Sometimes, instead of this general spasm, the influence of the wound is particularly felt in the muscles of the jaw, producing trismus, with the subsequent affection of the muscles of volition, and afterwards those of respiration, constituting tetanus. Sometimes the muscles of the posterior part of the trunk are more particularly affected, when the term *opisthotonos* is applied to the disease; and sometimes, on the contrary, the muscles of the anterior part are chiefly attacked, when the disease is named *emprosthotonos*. In the first case, the body is curved forcibly backwards; and, in the second instance, forwards. The muscles of the extremities become also extremely rigid and contracted, so that the joints cannot be moved; and, in the greater number of cases, life is destroyed in a few days.

Tetanus,
acute and
chronic.

However, it may be observed, that there are two kinds of tetanus; one of an acute form, which generally terminates the patient's

existence; and the other, of a chronic nature, which, after a time, is often recovered from.

The treatment which I have seen pursued Treatment.
in acute tetanus, has been,

The warm bath, which gives a temporary Warm bath.
tranquillity, and slightly reduces the spasms;
but is not followed by any permanent good effects.

Bleeding, which hastens the patient's Bleeding.
death; it reduces the powers of the body;
and, although the spasms are less violent,
they destroy sooner.

Opium, I have generally seen given; but, Opium.
in acute tetanus, never with any other advantage than a slight mitigation of the symptoms for a short period. I once saw Mr. Stocker give, at nine o'clock in the evening, half an ounce of tincture of opium, and at eleven o'clock an ounce more, without any permanent beneficial influence. To me, it appears to be absurd to resort to a treatment which has been repeatedly found to be inefficacious.

Tobacco injections I have seen used, but Tobacco.
with no permanent advantage.

Digitalis I have known employed, but Digitalis.
uselessly.

Ice I have seen extensively applied; but Cold.
all these means, in acute instances, fail.

Case. Mr. Ward, of Gloucester, has lately published two cases, which were relieved by the hydrocyanic acid.

Treatment
of chronic
tetanus.

Chronic tetanus I have known relieved by calomel and opium, by the cold and shower baths, by large doses of the tincture of muriate of iron; but I have also known persons recover who had scarcely taken any medicine; thus throwing a doubt upon the efficacy of those which had, in other cases, been supposed to be beneficial.

Trismus
rarely
fatal.

In every instance, in which I have witnessed the existence of trismus, the patient has recovered. Calomel and opium are the best medicines; and a blister to the head the most efficacious local remedy.*

* The following interesting case occurred in St. Thomas's Hospital, under the care of Dr. Elliotson and myself:—

James Frazier, æt. thirty-nine, of florid complexion, and robust appearance, employed in the London Docks as a porter, was admitted December 10. There were observed two small lacerated wounds on the inside of the ball of the left great toe. No crepitus indicative of fracture could be discovered. There was a slight degree of swelling, attended with violent pain.

He stated, that his toe had been dislocated, and thrown outwards, across the other toes, by the fall of a piece of timber. It had been, however, forcibly reduced, by a person present, while he was in a fainting

condition. He was brought to this Hospital immediately after.

The edges of the wounds were brought together, a dossil of lint was placed over them, and afterwards covered by a light poultice: the foot elevated on a pillow.

Cap: haust: purg: statim.

December 11. Evening. He was restless, with a pain in his head, back, and loins. Skin hot and dry; pulse full and hard, about eighty; tongue furred in the centre, and red at the sides; bowels costive.

Venesectio ad $\bar{3}$ xij. — Repet: haust: purg:

The dressings were removed from the foot, which was ordered to be fomented all night.

About an hour after the bleeding, the violence of the symptoms abated, and the man said he felt relieved.

December 12. Slept comfortably last night. Skin moist; pulse full and soft; tongue white; bowels have been opened.

The foot is very painful; the wounds are beginning to suppurate; the dorsum of the foot is red, tense, and swollen.

Applic: Hirudin: xij.

Capt: cal: gr ij opii gr $\frac{1}{2}$ o. n. inf: rosæ c mag: sulph: t. d.

The blood abstracted yesterday neither cupped nor buffed.

December 14. Was very restless. Skin dry; pulse smaller and quicker; bowels costive.

Foot very painful; still red, tense, and swollen; wound suppurating.

Repet. hirudin. xij. — Repet. haust purg.

December 19. Face flushed; skin moist; pulse small and quick; tongue white and furred; bowels relaxed.

Foot very painful, so much so as to disturb his rest, the wounds suppurating, and the degree of inflammation less.

Omit : calomel and opium.

Capt. Tinct : opii gtt. xxx. Si opus sit.

Foot to be fomented and poulticed as before.

December 22. Diarrhæa subsiding; but he laboured under great irritation both of body and mind.

December 24. Imperfect trismus came on yesterday afternoon, and increased towards this morning. He could not open his mouth more than three-quarters of an inch, nor protrude his tongue farther than the teeth. Deglutition painful, and articulation difficult; pain in the back of the neck, and a want of freedom in the motions of the head; no rigidity of the muscles; countenance anxious, and spirits very much dejected; skin bedewed with moisture; pulse quick, small, and compressible, 132; diarrhæa had ceased.

The wounds were suppurating healthily; granulations at the bottom ruddy; but perhaps the discharge was somewhat thinner; tension and swelling on the dorsum of the foot remained, but the redness was less.

Capt. ol : terebinth : $\tilde{3}$ ij statim.

Ferri : subcarb : $\tilde{3}$ ss. 2nd qque hora (in treacle.)

Applications to the foot as before.

December 25. Took the same quantity of ol. terebinth. at 10½ last night, which was followed by five or six copious dejections, but he was not able to swallow more than one dose of the ferri subcarb. on account of its thickness. He therefore took five grains of musk every four hours; this he commenced at twelve o'clock last night, and took four doses of it.

Mouth more closed; a perfect inability to swallow any thing but liquids; complains of pain in the back; the other symptoms of trismus the same.

Did not rest last night; face flushed; skin very moist; pulse the same.

The foot remained the same.

To omit the musk, and to take the iron mixed up with his beef tea every two hours, as before ordered.

Capt. vin. rub. $\frac{3}{4}$ iv. — Strong beef tea, $\frac{1}{2}$ iv. daily.

December 26. Mouth more closed; other symptoms of trismus the same; belly rigid in a slight degree.

Was restless last night; countenance anxious, and spirits much depressed; face flushed and hot; pulse the same; bowels opened twice during the night; troubled to-day with tenesmus and prolapsus ani.

Foot very painful, and appeared the same as yesterday.

December 27. The symptoms of trismus the same as yesterday; the belly more rigid, and he complained of a stiffness in the back, and a shooting pain through the scrobic: cordis.; his face not so hot or flushed; had no stool for the last twenty-four hours; tenesmus and prolapsus ani continued; perspires a good deal at night, and doses a little.

Foot very painful. While removing the poultice this morning, an abscess over the metatarsal bone of the great toe burst, and discharged an ounce or more of matter, of a greenish colour, streaked with blood.

Enema commune statim.

This produced one or two small evacuations. Hitherto (according to the nurse's account,) the fœces have been of a natural colour, but to-day they presented the appearance of the ferri. subcarb.

December 28. Morning. Mouth more closed; deglutition more difficult; articulation less distinct; the belly rigid, and there has been during the night convulsive movements in the muscles of the neck.

“Had no rest last night, and perspired a little; his

skin now cool ; pulse 112, very weak and small ; tenesmus has subsided.

About half-an-ounce of pus was evacuated from the dorsum pedis, (near the metatarsal bone of the little toe,) there was a fœtor arising from the wounds on the dorsum of the foot, while the original wounds were looking healthy.

Afternoon of the same day, all the alarming symptoms abated ; his skin became moist ; his pulse fuller and softer, and his mouth more open, with an improved countenance.

December 29. Mouth more open ; swallowing easier ; no pain in the back of the neck, nor any more convulsive movements about the muscles of that part ; belly soft.

Slept last night, and perspired a little, and had two motions from an enema ; countenance improved ; face not so flushed ; skin cool and dry ; pulse fuller and softer, but still weak ; appetite beginning to manifest itself.

Tension on the dorsum pedis quite subsided. The surface is still inflamed, but the redness is of a darker colour. The two wounds on this part looking very unhealthy, and the discharge fœtid and rather thin. The original wounds on the side of the great toe are beginning to cicatrize.

December 30. Mouth more open ; less difficulty in deglutition, and a more distinct articulation ; no pain in the neck or back ; the belly however is rigid.

Was very restless all last night, his foot being very painful ; skin cool ; pulse contracted and more distinct, about 120 ; during yesterday passed some small lumpy fœces.

The foot tense, red, and swollen ; the discharge has ceased, and there was a fœtor arising from the wounds,

which were looking unhealthy, accompanied with severe lancinating pains. The original wounds, however, were healing. Foot to be fomented.

Capt. ol. ricini $\bar{3}$ ss.

Enema cathart: si opus sit.

Beef tea, \mathbb{H} vj, instead of \mathbb{H} iv.

December 31. The castor oil operated five or six times, bringing away small lumpy fœces. The enema was not administered.

Opened his mouth readier, but not wider; complained of pain running through the scrob. cordis, and of a dry cough, which arose, he said, from his not being able to breathe freely; deglutition and articulation better.

Slept better last night, and did not perspire; countenance and spirits improved; skin cool; pulse 120, softer, and not so contracted.

Foot less tense and inflamed; discharge from the wounds returned, but it is still too thin; leg placed in a fracture box.

January 1. Symptoms of tetanus quite subsided, those of trismus less violent.

Much the same as yesterday; pulse 108, soft and more full; bowels relaxed, with tenesmus; motions come away of a dark colour, and in very small quantities.

Foot better; discharge more copious and healthy.

Capt. ferr. subcarb. $\bar{3}$ ss. 4tu. q: q: horâ, (in powder.)

January 2. The same as yesterday; opened his mouth wider, but was still obliged to be very careful in swallowing.

Foot looking better; the excess of inflammation quite subsided; the suppuration free and healthy. It was painful last night, and this prevented his sleeping.

January 3. Much improved; pulse ninety-nine, softer and fuller.

Suffers very much from a collection of the iron in his rectum, a quantity of which was removed in a partially dry state; this prevented his sleeping last night.

Capt. ferr. subcarb. 6ta. q : q : hora, (in treacle.)

Enema commune—pro re nata.

Foot improving; discharge healthy and free.

The fracture box removed.

January 4. Same as yesterday.

January 5. Much improved; pulse eighty-eight, a great deal softer and fuller; has removed a very large quantity of iron from his rectum.

From this period he gradually recovered, without any further relapse; he continued, however, for some time, to pass portions of the subcarbonate of iron with his stools. The sudden improvement of the patient on the evening of the 28th, after the evacuation of the pus from the dorsum of the foot, cannot fail to strike any one, who may carefully peruse the above account; and I think it will require further trial of the iron before its efficacy in this formidable disease can be relied on.—T.

LECTURE XXXVIII.

Of Wounds of Arteries.

THESE wounds we shall divide, as wounds Incised.
in general, into the Incised, Lacerated, Con-
tused, and Punctured.

When an artery is cut into, or divided, the immediate effect of such injury is to occasion an impetuous hæmorrhage of florid blood, which, if the artery be large, whizzes through the wound. It flows in pulsation in obedience to the action of the heart.

If the wounded orifice, nearest to the heart, be compressed, the blood from the opening, most remote from the heart, flows in an uninterrupted stream, and is of a dark venous colour, owing to its having passed through capillary vessels.

The brain soon ceases to be supplied with blood, and fainting is produced: sensation Fainting
produced.
and volition become suspended; and the action of the heart is in a great degree suppressed; the flow of blood from the wound becomes much diminished, and sometimes entirely ceases.

Recovery
from faint-
ing.

In a few minutes the patient opens his eyes, and the power of the nervous system is restored.

Modes of
arresting
the bleed-
ing.

The mode by which bleeding is arrested may be either constitutional or local. Fainting is the constitutional mode, by suspending the voluntary and involuntary functions, more especially in the diminution of the action of the heart, so that the blood scarcely reaches the wound, but it undulates in the heart, and large vessels under the fluttering of the heart.*

Local
means.

The local means consist in, first, the coagulation of the blood, which is effected in the cellular tissue around the artery, and also in the extremity of the wounded vessel, forming a plug; so that there is a continuation of coagulum from the outer surface to the orifice, and this sufficiently opposes the issue of blood under the enfeebled action of the heart.

Contraction of the
vessels.

But this process is also aided by the contraction of the artery, not particularly at the divided part, but also to a considerable extent from the orifice.

If the carotid artery, on one side, be cut

* The brain and nervous system are, however, sometimes so depressed, that without stimuli to the stomach and nose, the person will not recover.

across, and examined after the death of the animal, the artery is found much smaller on the wounded side than on the other which has not been injured. This state of the vessel lessens the influence of the blood upon the wound.

A retraction of the artery also follows when the division of the vessel is complete ; and, by withdrawing itself into the cellular membrane, the blood becomes effused around it, so as to compress its orifice. Thus, then, it appears that coagulation with contraction and retraction of the vessel, all concur to put a check to the bleeding.

Retraction
of the ves-
sel.

These, then, are the immediate means ; but it is required that a further process should take place, to render their effects permanent. Inflammation follows ; and the clot of blood becomes glued to the inner surface of the vessel, whilst effusion into the surrounding parts creates pressure upon the artery so as to diminish its calibre ; this inflammation also usually produces a union of the edges of the wound, or otherwise granulations arise, fill it, and thus it becomes closed.

Process of
inflamma-
tion.

The treatment, when an artery of not a very large size, is divided in an extremity, is to apply a tourniquet to compress the trunk from which it is supplied ; this, with

Pressure.

gentle pressure on the wound, for a short time, will generally command the hæmorrhage, when the edges of the wound may be approximated, and union promoted, leaving on the tourniquet, so as to continue a moderate pressure on the trunk.

Applica-
tion of a
ligature.

But, if the vessel be large, it is necessary to make an incision in the direction it takes, so as to expose the wounded portions, when a ligature must be placed above and below on each portion of the vessel. The ligatures should be small, and one of the ends removed after their application. Dr. Vetch first recommended the removal of one of the threads.

When an artery is not completely divided, its retraction is prevented, and a coagulum, with difficulty, forms in it, and, when formed, is easily forced off by the action of the heart. Hence, in a week or ten days after the injury, bleeding will sometimes occur; and repeated hæmorrhage will destroy the patient if a ligature be not applied. I have known the temporal artery bleed eleven days after its partial division, and when the wound in the integument was almost closed.

The treatment of this injury consists in completely dividing the vessel, when its retraction enables a coagulum to form in, and around it; but, if the artery be large, a ligature must be applied.

Lacerated Arteries.

These bleed comparatively little.

A sailor, on board a Margate Packet, was Case.
bringing up his vessel in the river, and having his leg in a coil of the cable, the anchor was unexpectedly let go, when the cable caught his thigh, and tore off his leg six inches above the knee, excepting that a small portion of skin on the outer part still connected the parts; the bone was broken; the artery, vein, sciatic nerve, and muscles, were all completely separated. A handkerchief was bound around the wound, and he was brought to Guy's Hospital. The artery had ceased to bleed, but he had lost a considerable quantity of blood. I amputated his limb, and he proceeded favourably for ten days, when he was seized with tetanus, and died.

I have also seen the foot torn off above Case.
the ankle, and the bleeding stop without the aid of tourniquet or ligature.

The case, related by Cheselden, of the Cheselden's
arm being torn off at the shoulder without case.
much hæmorrhage, is known to every surgeon.

There are two causes which operate to prevent bleeding :— Causes which prevent bleeding.

1. The cellular tissue is sometimes drawn over the mouth of the vessel, and makes a ligature upon it, which stops the blood.

2. Another state of the artery produces the same result, and in which the mouth of the vessel remains open, the coats of the artery are excessively elongated, and its sides fall together so as to render its canals impermeable.

Treatment. The best treatment is to apply ligatures upon lacerated arteries, if they be large; otherwise, when the powers of circulation are restored, there is a danger of hæmorrhage.

Of Punctured Arteries.

Consequences. They produce different symptoms from the other wounds of arteries in this respect, that the external opening being small, the blood does not readily escape; and therefore coagulates in the cellular tissue, and forms a swelling there, which gradually increases in size as the blood issues from the wound in the artery; the impetus of the blood causes a pulsation; and the cellular membrane, around the extravasated blood, being condensed, form a sac, which impedes the evolution of the swelling. The external

wound heals, and thus an aneurism is formed.

It may be said that it differs from an aneurismal swelling in the mode of its production ; and this is true, but it still has the other characters of the disease, and requires the same treatment.

Puncture
in bleed-
ing.

I have several times known it happen from bleeding in the arm ; in one case the radial artery was wounded, but in all the other cases, the brachial artery.

Case.

The first case was in a patient at Guy's Hospital, a dresser of Mr. Lucas, senior, bled the man, and he came to me excessively alarmed, telling me what had happened, and that he had great difficulty in stopping the hæmorrhage, but had at last succeeded, by applying a very tight bandage. A short time afterwards the man came to Guy's, and showed his arm to Mr. Lucas, who, seeing the aneurism, and hearing the cause, told the man that he must submit to an operation, which the patient refused. In walking home, he met an old acquaintance, to whom he told the circumstances ; this friend, who occasionally bled and drew teeth, said he would cure him, and inviting him into his shop, he put a lancet into the swelling, and finding blood impetuously escape, he as quickly escaped from his shop. The patient finding himself

bleeding, fortunately put his hand upon the wound, and called for assistance. A bandage was bound tightly round his arm, and he went to St. Thomas's Hospital, where Mr. Cline operated upon him, when the radial artery, in consequence of a high division, was found to be the wounded vessel.

Case.

One of the apprentices at Guy's Hospital had the misfortune to wound the brachial artery in bleeding, he immediately perceived the nature of the mischief, but before he could arrest the bleeding, thirty-seven ounces of blood were lost. He bound up the arm extremely tight, and when the bandage was removed a few days after, an aneurismal swelling appeared at the fore part of the elbow, for which an operation was performed, of tying the artery at the part, an operation which was attended with great difficulty, and the patient died.

Case.

I once assisted Mr. Chandler in performing the operation for brachial aneurism, produced by bleeding; the sac was opened, and the orifices above and below were secured by ligatures, but still there was a free hæmorrhage, from an anastomosing vessel, which it

Treatment. was necessary to secure.

The treatment of this injury consists in the immediate binding up of the wound, and applying a tourniquet to the middle of the arm, which should press upon the artery, and

upon the opposite side of the arm only, leaving the circulation by amastomasis as free as possible.

If aneurism forms.

If an aneurism still follows this accident, the tourniquet is to be continued, as described in the lecture on aneurism.

Operation.

Should the tumor still continue to increase after this has been fully tried, it will be proper to make an incision upon the brachial artery, about midway between the elbow and shoulder joints, and place a ligature upon it, but upon no account cut down upon the wounded vessel at the elbow.

In one instance, after I had applied a ligature to the brachial artery, I was surprised to find the thread completely separated on the fifth day; but the ulcerative process was probably accelerated by the inflammation which existed previous to the application of the ligature. The patient recovered.

Of Contused Wounds of Arteries.

Gun shot wounds and severe bruises sometimes destroy the vitality of a portion of artery. As it will afterwards slough, there is a remote danger in such a wound, which must be carefully guarded against. The slough will not separate until from eight to

Danger of.

ten days, or more, after the wound has been inflicted; and then the patient, without precaution, may lose an immense quantity of blood, and sometimes be destroyed by the hæmorrhage.

The slough opens the vessel upon its side; and, no retraction ensuing, the hæmorrhage is unrestrained by the coagulation of the blood.

Treatment. In these cases, it is required that the patient should be kept at rest until the sloughing process be completed; and he must be instructed in the tightening of a tourniquet, which must be applied, and left constantly upon the limb, until all the sloughing has ceased.

Case. A gentleman received a shot through the calf of his leg, and was proceeding so well as to be suffered to sit up, and to put his limb to the floor; on the seventeenth day, he was seized with a severe bleeding, from the effects of which he sunk.

ON THE TREATMENT OF WOUNDS OF PARTICULAR ARTERIES.

Arteries of the Scalp.

Wounds of these arteries require in their treatment,—first, a complete division of the

injured vessel;—second, the application of pressure;—by the first, retraction is permitted, and future bleeding is prevented; by the second, the present hæmorrhage is suppressed.

I was called one night to see the son of Case.
Dr. Johnson, who was bleeding freely from the temporal artery, which had been opened by a leech. I did not like to make an incision, but advised the application of a small tourniquet, which completely succeeded, and this instrument I should advise in all wounds of arteries of the scalp, as the means of pressure.

In aneurism, from wounds of the arteries Of aneu-
of the scalp, I have, in each case that I have rism.
operated upon, been obliged to open the aneurismal sac, and to tie each communicating artery.

The aneurisms which I have seen on the scalp from injury, have been in the temporal and posterior aural arteries, and have arisen from wounds and contusions.

Carotid Artery.

The wounds of this artery are usually so Speedily
speedily fatal, that surgery is rarely able to fatal.
preserve life.

Securing
the artery.

In tying the artery the pars vaga must be excluded from the thread, and although the dissection of parts from the artery cannot be made at the moment of securing the ligature, yet when the hæmorrhage is stopped, a fresh ligature may be placed upon the artery alone, instead of depending upon that which has been of necessity employed at first.

Subclavian Artery.

Torn.

I have never seen this artery wounded, but I have seen it torn through.

Case.

A man was brought into Guy's Hospital with a fracture of the clavicle, in which accident the shoulder was very forcibly drawn back to the spine. The dresser had to bleed this man in the injured arm, but little blood could be drawn; and, thinking that he had not passed the lancet sufficiently deep, he plunged it so far as to wound the brachial artery. The blood which issued from the wound, was of a venous character, but it required a very tight bandage to stop the hæmorrhage. Great tumefaction succeeded about the shoulder, gangrene began in the arm, great constitutional irritation followed, and the man died. Upon examination of the body after death, it was found that after the

fracture of the clavicle, the scapula was forcibly drawn back, so that the subclavian artery was torn through, but a cord of cellular membrane united its ends, so that the extravasation of blood had been very slight.

Axillary.

Mr. Key operated, and tied the subclavian artery, on account of an aneurism of the axillary artery which had been produced by a forcible extension of a dislocated os humeri.

Mr. Key's case.

Brachial Artery.

This artery I have often known wounded in bleeding.

Wounded in bleeding.

A slight bandage, and a thick dossil of lint as a compress, have succeeded in healing the artery.

Treatment.

If aneurism forms, the tourniquet should be employed, as I have described; and if this does not succeed, apply a ligature upon the brachial artery. Make an incision in the middle of the arm, on the inner side of the biceps, and take care to exclude the vein and median nerve from the ligature.

When an aneurism forms.

Ulna Artery.

The wounds of this artery are usually at the lower part of the fore arm, where the vessel is situated, between the tendons of the flexor carpi ulnaris, and the flexor profundus; it is accompanied by the cubital nerve, which is placed close to the artery, and which must be carefully excluded from the ligatures. On account of the free anastomosis between this artery and the radial; the application of two ligatures, one above, and another below the opening into the vessel, is absolutely necessary to effectually stop the hæmorrhage.

Radial Artery.

This artery is much more frequently wounded than the ulna, being in every respect more exposed. The application of two ligatures is equally necessary, as in the ulna, and for the same reason. This vessel is readily found on the outer side of the flexor carpi radialis, and it is not accompanied by any nerve of magnitude.

Of the Palmar Arteries.

Wounds of the palmar vessels are very frequent, but generally the bleeding may be stopped by steady and continued pressure, by means of a compress and bandage, and by a tourniquet on the brachial artery; the application of cold, and attention to position, will materially assist. Should these means fail to arrest the bleeding, and if the openings of the divided vessel cannot be easily found, it will be necessary to secure the ulna, or radial arteries, or both; as from the very free communication of these vessels, the securing of one only, will not, in many instances, prevent further bleeding. It will be best, however, in wounds of the superficial palmar arch, under such circumstances, first to put a ligature upon the ulna artery, and then try pressure again, before the radial is taken up; which should not be done unless a troublesome hæmorrhage continues. On the contrary, should the deep palmar arch be the seat of injury, and it become necessary to secure an artery, the radial should be first tied, and afterwards, provided the bleeding does not stop, the ulna should be likewise secured.

Frequently
wounded.

Of the Femoral Artery.

High up
in the
groin.

If this artery be wounded high up in the groin, the finger must be thrust into the wound to stop the bleeding, until a compress can be applied upon the pubes, and the vessel be secured.

In the mid-
dle of the
thigh.

If it be wounded in the middle of the thigh, in the mode which I have described in the case of a relation of Mr. Saumarez, a large swelling will immediately form, and the artery will be deeply situated, under a large coagulum.

Treatment.

A free incision must be made to give the surgeon ample room to proceed in securing the wounded vessel, a tourniquet being first applied. The direction of the incision will be that required in the operation for popliteal aneurism, only it must be more extensive. The coagulum, which is then exposed, must be scooped out from the wound by the fingers, and the parts be cleanly sponged. The tourniquet is then to be loosened, and the aperture in the vessel will be directly seen, when the tourniquet is to be again tightened, and two ligatures are to be placed in the artery, one above, and the other below the wound, an end of each thread being cut off; the edges of the wound are to be approximated, so as to favour the union by adhesion.

It is always right in these cases to divide the artery, between the ligatures.

Of the Popliteal Artery.

This vessel is so protected by the condyles of the os femoris, and so concealed behind the bone, that it is rarely lacerated, and when it is so, the wound must be highly dangerous, as it will be probably complicated with a division of the sciatic nerve. Rarely wounded.

It was a case of this accident which first attracted my attention to surgery, and which taught me its value.

A foster brother of mine, named John Love, Case. aged about thirteen years, was playing and fell, as a waggon was passing, and one of the wheels of the waggon went over the back of his knee, as he laid with his face to the ground. The waggon was stopped, and when he was drawn from under it, a stream of blood directly burst from his ham ; a handkerchief was tied tightly over the wound, and he was put upon the waggon, and was carried home in a fainting state. Different surgeons in the neighbourhood were sent for ; but when they heard the nature of the case they all made excuses ; one had a most dangerous case of fever, another was at a labour ; a third with a

pressing case of inflammation of the bowels ; they were all engaged, and could not come, or, like the hare and many friends,—

“ The first, the stately bull implored,
 “ And thus replied the mighty lord ;—
 “ Since every beast alive can tell,
 “ That I sincerely wish you well ;
 “ I may without offence pretend,
 “ To take the freedom of a friend.
 “ *Love* calls me hence,” &c.

Tired of waiting, an old woman (who was deemed a sorceress in the village) was applied to, and she sent back the messenger, saying, that the bleeding would be stopped by the time they returned ; and so it was, for John Love had expired.*

This scene made a strong impression upon my mind, as it was the first death I had witnessed, and I was directly convinced how valuable a member of society a well informed surgeon must be, and how great a curse an ignorant surgeon was. If the artery could not have been tied, the limb might have been amputated.

Danger in
 tying the
 artery.

In tying the artery in the ham, there is some danger of including the sciatic nerve,

* This was forty-three years ago, when a man who had recovered from the operation, for popliteal aneurism, was deemed a sufficient curiosity to be annually shown to the students at our Hospitals.

as it is placed above the artery in cutting into the ham, and, it must be carefully avoided; the artery must be drawn from the vein where the large nerve is placed upon it. Mr. Cline once saw the nerve included in a ligature in the operation for popliteal aneurism, and the patient died in a few hours.

Of the Posterior Tibial Artery.

These injuries at the upper part of the leg are very unfrequent, but they do sometimes occur. Rare at the upper part.

A man was brought into Guy's Hospital, Case. who had fallen from a considerable height, upon a cart, and an iron peg in the cart had passed through the calf of his leg, between the tibia and fibula; a profuse hæmorrhage ensued, but by the application of a tourniquet it was stopped. In six days the bleeding recurred, when the tourniquet was tightened, and the flow of blood was again suppressed; but in two days hæmorrhage again took place. I tied the femoral artery at the usual place, and for a week the man went on well, but then the bleeding was renewed, and I was obliged to amputate the limb. On examining it after removal, it was found that the iron had passed through the posterior tibial artery, at the origin of the anterior

tibial, and had penetrated between the tibia and fibula.

Immediate
amputation.

An immediate amputation would be the best course to pursue.

In compound
fracture.

I have several times known the posterior tibial artery wounded by the bone in compound fracture; once, in a patient of Mr. Chandler, and a piece of lint was forced into the wound, which stopped the bleeding, but it was followed by gangreen, of which the patient died.

Case.

In a case of Mr. Lucas's, in Guy's Hospital, Mr. Pollard, his dresser, secured the artery, and the patient did well.

Case.

A patient of Mr. Key's, a boy, upon whom a tourniquet was applied, had the bleeding restrained, and it did not return.

Case.

In a patient of Mr. Travers's, it was wounded by a scythe, and was tied by Mr. Travers, in the theatre at St. Thomas's Hospital; the patient did well.

Case.

It is sometimes wounded by the employment of the adze. I was called to a case at Hunton Bridge, Herts, by Mr. Wingfield, surgeon, at Market Street. The wound was small, and the artery cut, but not divided; the injury had happened three weeks before I saw the man, the bleedings had been very frequent, and were restrained for a time by pressure on the wound, by means of a tourniquet.

As the man had become excessively reduced by the last hæmorrhage, and could not have survived another, as soon as I was called in I tied the artery; just as I had secured the vessel, the man fainted, and I thought he would have died, but he ultimately recovered.

In wounds of this artery at the upper part of the limb, I should first apply a tourniquet, then place the limb in a bent position, so as to relax the gastrocnemius muscle, which I should raise from its attachment to the tibia, so as to expose the artery and its accompanying nerve, which I should be careful to exclude, whilst I put two ligatures upon the wounded vessel, and afterwards should carefully close the wound and unite by adhesion. Treatment.

At the lower part of the limb the artery is easily found, and secured behind the malleolus internus, it is accompanied by the posterior tibial nerve, which lies on its fibular side must be avoided. At the lower part.

A wound of the interossial artery I have never seen; but in the case of such a wound I should cut upon the vessel from the outer part of the leg, and seek it between the tibia and fibula, close to the fibula. Interossial artery.

Of the Anterior Tibial.

This vessel is rarely wounded at the upper Protected above.

part of the limb, but frequently at the lower. Lying between the two bones above, it is much protected.

How secured,

When wounded at the upper part of the limb, an incision must be made on the outer side of the tibialis anticus to find it: a tenaculum, or a pair of forceps, must be employed to raise the wounded artery, to remove it from the interosseous ligament; and then two ligatures are to be applied upon it.

In compound fracture.

I have seen it wounded in compound fracture. First, in a brewer's servant, a patient of Mr. Birch's, in St. Thomas's Hospital; the artery being tied, the compound fracture proceeded quite favourably.

Case.

In a second case the result was singular. A man was brought into Guy's Hospital; with a compound fracture of the leg. A few days after his admission, he had a free hæmorrhage from the wound, which was stopped by the application of the tourniquet; but at different intervals the bleeding was frequently renewed, and I was at length compelled to amputate his limb. Upon examining it afterwards, a spicula of bone was found penetrating the anterior tibial artery, and the opening into the vessel thus produced, had been enlarged by a process of ulceration, so as to give rise to the hæmorrhage.

When the anterior tibial artery is wounded Operation.
 low down in the leg, it must, when it is tied,
 be completely raised from the tendons of the
 tibialis anticus, and extensor proprius pollicis,
 between which it is placed; both ends must
 be secured.

This artery is sometimes wounded on the On the
dorsum of
the foot.
 upper part of the foot, where it is placed
 upon the navicular bone, and the middle
 cunieform, by a knife or chisel being dropped
 upon the foot.

Each extremity of the divided vessel must
 be carefully tied, otherwise the hæmorrhage
 will continue, on account of the free anasto-
 mosis of this artery with the plantar.

Of the Plantar Arteries.

For a wound of either of these arteries, I Treatment.
 should first try what the application of a
 bandage, with a compress upon the wound,
 and a tourniquet upon the thigh would effect,
 and should tie the posterior tibial artery, after
 an extended and unsuccessful trial of these
 means; for so deeply is the artery placed,
 and so situated amongst tendinous parts
 and nerves, that incisions should not be made
 at the wounded part.

Styptics.

Wool.

In bleeding from small vessels on wounded surfaces, very fine wool laid down and confined by bandage upon the part is one of the best styptics. The wool may be dipped in flour to add to its efficacy.

Turpentine.

Turpentine is said to have power as a styptic, and I have seen bleedings stopped by it when it has been applied by lint, and with pressure; but merely poured upon the wounded surface it appears to me to be quite powerless.

An old prescription.

There is an old prescription for a styptic in St. Thomas's Hospital, which I have seen useful.

R. Pulv : Catechu

Pulv : Bol : Armen : aa ʒij.

Alum : ust : ʒj.

Tinct : opii. q. s. at fiat pasta.

This will stop the troublesome bleeding from leech bites.

LECTURE XXXIX.

Of Wounds of Veins.

Mr. Travers has published a very good paper upon the mode in which they heal.

Travers's
paper.

In a healthy constitution they are little dangerous, as the cellular tissue adheres over the apertures which have been made in them, and inflammation speedily closes them.

In healthy
persons not
dangerous.

I once saw the axillary vein wounded in removing a scirrhus gland from the axilla, a dosil of lint was placed in the wound, and the arm was confined to the side, when no bleeding of consequence ensued.

Case.

In unhealthy constitutions they inflame and suppurate; they also ulcerate, and sometimes life is destroyed, by bleeding or by the inflammation extending to the large vein, and to the heart.

In unheal-
thy persons
dangerous.

Several cases of this kind I have witnessed; and in the greater number the wound of the vein had been made to abstract blood for inflammation of the lungs; and I have thought that the inflammation of the vein was the result of the impediment to the pulmonary circulation.

The patient in a few hours after the bleeding, complains of tenderness in the arm, and

Symptoms
of inflam-
mation.

requests to have the bandage loosened ; he next finds great pain in extending the limb ; the wound looks red, and its lips are separated. Then the plexus of veins on the fore arm become swollen, hard, and very painful ; afterwards the basilic vein of the upper arm feels as a solid body, and is much enlarged. High constitutional fever ensues. If the patient has sufficient power of constitution, abscesses form in the veins of the fore arm ; and by opening these early, great relief is afforded ; but if the habit be particularly feeble, the matter which is produced by the suppurative inflammation, does not point, but it remains in the veins, producing excessive constitutional irritation, which destroys life.

Appear-
ances.

Upon inspecting the vein after death, it is found partly filled by adhesive matter, and in part by pus. There is in the collection at St. Thomas's Hospital, a beautiful specimen of abscess in the longitudinal sinus of the dura mater. I have seen the jugular vein inflamed and adherent throughout the greater part of its course.

Specimen.

We have, in the collection at Guy's Hospital, the femoral and iliac veins obliterated, taken from a patient who had phlegmatia dolens ; which disease has been extremely well described by Dr. Davis, in the " *Medico Chirurgical Transactions*."

But the worst cases of inflammation of veins which I have seen, have arisen from the application of ligatures to the vena saphena.

Division of
the saphena.

First, I have seen a disease like phlegmatia dolens follow the division of this vein.

Consequences.

Secondly, numerous abscesses form and break, sometimes destroying life, at others producing excessive irritative fever, from which the patient has been with difficulty recovered. One patient became insane during the irritation, and did not afterwards recover her mental faculties.

Thirdly, they have died from suppurative inflammation, without any abscess appearing, and this is the cause of death after the operation of amputation, when it is performed during a very unhealthy state of the constitution. I have seen, under these circumstances, both artery and vein, in a stump, in a state of partial adhesion and suppuration.

I saw, in Paris, in 1792, a case in which life was destroyed by suppuration of the femoral vein, after a gun-shot wound.

Of the Treatment of Wounds of Veins.

The first and greatest object is to empty the veins as much as possible, by the position of the limb, which should be such as to allow of the gravitation of the blood to the heart.

Position.

In the arm, an inclined plane ; in the leg, the position for a fractured tibia. This prevents accumulation of blood, and distention of the vessels.

Gentle
pressure.

Secondly, a roller, from the extreme part of the limb, to the wound, wetted with the liquor plumbi subacetatis, and spirit should be applied to approximate the sides of the vein, and to make gentle pressure.

Thirdly.—Leeches should be freely applied, and if suppuration be produced, fomentations.

Wounds of the Abdomen.

Two kinds.

These injuries are of two kinds : 1. Those in which the cavity is opened, but the viscera are not wounded. 2. Those in which some of the viscera suffer.

First kind,
often re-
covered
from.

With respect to the first of these it is scarcely necessary to say, in the present state of surgical knowledge, that very extensive wounds of this description are often recovered from, as is proved by the operations for umbilical or ventral herniæ, by the Cæsarian section ; and, recently, by the removal of enlarged ovaria.* But the most curious circumstance in these wounds, is the manner in which the intestines glide away from the

* See cases by Mr. Liston.

sharpest instruments, and escape injury. I shall relate two cases:—

In the year 1785, my second year of being Case.
at the Hospital, a gentleman came almost breathless to the Hospital; and finding me the only person there, requested that I would immediately accompany him. He took me to a house in the Borough; and, leading me up stairs, showed me into a room, where I found a female in her shift only, lying upon the floor, weltering in her blood. I with difficulty raised her, and placed her upon the bed she had just quitted. On examining her, I found four wounds in her throat; one of which was deep and extensive. These I closed by sutures; after which she was able to speak; and I then asked her what had induced her to commit the act; she made an incoherent reply; but repeated the word stomach two or three times, which induced me to raise her linen, when I was surprised to find her bowels exposed by a wound reaching nearly from the pubes to the ensiform cartilage of the sternum; for, after cutting her throat with a razor, she had ripped up her belly with it, and let out her bowels, but the intestines were still distended with air; and I had a difficulty in returning them into the abdomen. They had not received the smallest wound. Dr. Key now came into

the room, and I proceeded to sew up this extensive opening; but she died in nine hours.

Case. Mr. Tolman and myself were sent for to see a gentleman who had stabbed himself in several parts of his abdomen, with an old rusty dirk, and had for some time afterwards concealed himself from his family. When found, it was discovered, that a portion of omentum protruded through one of the openings; this was carefully returned; but, notwithstanding, the dirk still possessed its point, the intestines were not injured, and he recovered without a bad symptom.

The free motions of the intestines upon each other, independent of the peristaltic motion, is a great preservative in wounds of, and blows upon the abdomen.

Peculiar symptoms. There is another curious circumstance in wounds into the abdomen; which is, that they immediately produce universal coldness and paleness, with nausea and faintness, excepting in the operation for strangulated hernia; in which case the intestine has been accustomed to violence.

Treatment. In the treatment of these wounds, it is best to make interrupted sutures; the needle should penetrate the skin and muscles, but not the peritoneum. If the muscle be not included in the ligature, a hernia is sure

afterwards to form; and, if the thread is introduced through the peritoneum, it adds much to the danger of abdominal inflammation.

Between the sutures, strips of plaister, or of lint dipped in blood, should be applied, and the patient should be freely bled from the arm. If the local inflammation be great, leeches should be employed; purgatives must be avoided, and food must not be given for several days.

Of the Second Kind of Wound of the Abdomen.

Wounds of the abdomen, extending to the stomach, or intestines, are extremely rare. Rare.

There, danger is much lessened, if the wounded portion of the viscus protrudes through the opening in the parietes; for, if not, they are generally fatal. Dangerous.

Wounds of the Stomach.

The best case which I have heard of, is related by Mr. Scott, in the medical communications, from which the following account is taken:—

“During the election for Weymouth, in Mr. Scott's case.

March, 1784, Charles Thomas, a seaman, aged twenty-five, of a strong and healthy constitution, had the misfortune to receive a thrust with a small sword on the left side of his body. The sword passed in between the second and third of the lower false ribs, and penetrated into the cavity of the abdomen in an horizontal direction, to the extent of more than five inches, as appeared afterwards by the mark upon the blade.

“ I saw him about half an hour after the accident. His whole appearance was then much altered ; his countenance being quite collapsed, and covered with a cold sweat, while the pulse at his wrist was scarcely perceptible ; he had also a constant hic-cough, a frequent retching and vomiting of blood, and a considerable discharge of blood, and other fluids, from the external wound.

“ From the place and manner in which the sword had entered, and the symptoms that followed, I was led to conjecture that the stomach was wounded ; and that this was certainly the case, I was soon convinced, on examining the fluid discharged by the external wound, and finding in it several small pieces of meat in a soft digested state, together with some particles of barley.

“ He had complained of thirst, and some barley-water had been given him to drink ;

but this had been immediately thrown up after passing the œsophagus. Other mild fluids were now tried, as were likewise a common saline draught, in an effervescent state, and some thebaic tincture, but with no better effect; and they were all instantly rejected, tinged with blood.

“The retching and action of the stomach continuing to be very violent, and the patient complaining, at the same time, of a lump, or dead weight, as he termed it, in his inside, he was desired to drink some warm water; this was soon thrown up, accompanied with a good deal of barley in solid grains, with the surface slightly broken, and some pieces of meat in a half-digested state. More water being given him, it was quickly returned, tinged with blood, but, otherwise, nearly as pure as when swallowed.

“I now proposed that we should avoid giving any thing farther by the mouth; but, as the spasms and hiccough were still very frequent, an emollient clyster was administered, by which a considerable quantity of fœces was discharged. Soon after this, another clyster, containing twelve ounces of barley-water, and ʒij of thebaic tincture, was thrown up, and the greater part of it retained. Warm fomentations were likewise applied externally; the surface of the

wound was loosely dressed; and he was desired to lie as much as possible upon the injured side, with a view to favour the discharge.

“On the first of April, the day after the accident, the symptoms were still very unfavourable. His pulse continued low and languid, with a great prostration of strength, and a coldness of the extremities. He had had several rigours towards morning, and the spasms were sometimes very violent. He complained of extreme coldness over his whole body, and of a constant gnawing pain about the pit of his stomach, to which part warm fomentations were frequently applied.

“A laxative clyster was again administered, which was followed by a copious discharge; soon after this, another clyster, consisting of fourteen ounces of veal broth, and two drachms of thebaic tincture, was thrown up and retained. A similar clyster was repeated in about four hours, with the same effect. Flannels, dipped in warm milk and water, were occasionally applied to his arms and legs, and hot bricks to the soles of his feet. He made a little water twice in the course of twenty-four hours; this was highly coloured, and deposited no sediment, though kept for a considerable time.

“April 2. He had passed a restless night,

and now complained of intense thirst. The hiccough and spasms were less frequent, but he suffered much from a constant burning pain in the lower part of his stomach. His pulse was small, and beat about 120 in a minute. The fomentations were applied as usual; and ʒvj of the sal: cathart: amar: were dissolved in some broth, and thrown up into the bowels as a laxative. This produced a considerable discharge of soft slimy fœces, in which were several small pieces of clotted blood enveloped in mucus. After this, in the course of the day, three clysters of broth and thebaic tincture were thrown up and retained. He was desired to use the pulp of an orange occasionally, to allay his thirst, and to wash his mouth frequently with barley water acidulated with lemon juice.

“April 3. I was called to him early in the morning, and told he was at the point of death. A clergyman had been sent for at the same time to perform the last offices. The nurse informed me, that, whilst supported in bed to wash his mouth, he had been seized with a violent retching, accompanied with convulsions of the chest, but that nothing had been discharged from his stomach, except a small quantity of bloody fluid. When I saw him, the spasms still continued; his forehead and breast were

covered with a cold sweat; his pulse was low, and intermitted; so that it could only be felt at intervals; and his strength seemed to be quite exhausted. Warm fomentations were immediately applied to the region of the stomach; and, as there was always some of the veal broth kept in readiness, I threw up about fourteen ounces of it, with ʒij of the thebaic tincture. The violence of the symptoms was soon moderated, and he appeared very languid, and showed a disposition to sleep.

“When I saw him about four hours afterwards, I was told that he had enjoyed some rest. His pulse was now regular, but small and quick; he was very weak, and just able to inform me, that, in washing his mouth, he had accidentally swallowed some of the liquor, and that this had thrown his stomach into violent action. About one pint of the broth was now injected without any addition. This was likewise retained, and repeated at intervals of five or six hours. He now made water frequently, which, upon standing, deposited a considerable quantity of sediment, of a light brick, or straw colour.

“April 4. The hiccough, retching, and other unfavourable symptoms, were now entirely gone; but he still complained of a fixed pain

in his stomach, accompanied with a sensation of heat, and of a soreness of the injured side, extending from the wound toward the middle of the abdomen. He was likewise troubled with thirst; his pulse was small, and about 110. The external wound had now began to yield a discharge of good matter.

“The same mode of treatment was continued, and the symptoms became daily more favourable. The broth was administered in clysters, to the amount of two quarts, or five pints a day. The fomentations were continued externally, and his feet and hands were frequently bathed in warm milk and water. He voided his urine regularly, and in about the proportion of three pints in the twenty-four hours, though it sometimes considerably exceeded this quantity, and continued to deposit a great deal of sediment. A little of the sal: cathart: amar: was occasionally added to the clysters in order to stimulate and cleanse the intestines; after the fourth day, however, there was scarcely any fœculent matter discharged, but only a small quantity of viscid bile.

“On the 10th day from the time of his being wounded, he appeared to be very sensibly relieved; his thirst and febrile symptoms were much abated, and his pulse was regular, and about ninety. As he was in good spirits,

and expressed a wish that he might be allowed to swallow something, I procured some calf's-foot jelly, made luke-warm, of which he ate half a pint, without feeling any bad consequences. The only remarkable circumstance that attended the first time of his swallowing, was, that it occasioned frequent eructations, and a great discharge of air; but this, according to his own account, produced rather a grateful sensation than otherwise. Next day he was allowed some new milk for breakfast, and some chicken broth for dinner. The nutritious clysters were continued, however, till the 16th day, though less frequent than before. From that period, for about a fortnight, he lived wholly on bread and milk, and light broth. He was then allowed chicken, veal, and other meats easy of digestion. The external wound had been healed for some time, and he recovered his strength very gradually. The only inconvenience he suffered was from costiveness, and a sense of soreness and stricture which extended from the external wound towards the middle of the abdomen. This was particularly felt after a violent expiration, or any sudden extension of the body, when, to use his own expression, his side was drawn inwards and upwards. The costiveness was obviated by mild laxatives, and gently stimu-

lating clysters, and went off entirely as the intestines recovered their true and natural action. The other complaint which I apprehend to have originated from an adhesion of the inflamed stomach, to the peritoneum, seemed to go off gradually as he recovered his strength; though it was still felt in a certain degree in stooping, walking quick, or any great exertion of the body. When I last heard of him, two months ago, he enjoyed good health.”*

“This case affords a striking instance of the resources and peculiar powers with which nature has endowed the animal machine, for its preservation, and for remedying any injury it may sustain. The treatment was such as was necessarily suggested by the symptoms. The wounded stomach was so extremely irritable, that even the mildest fluids increased the violence of its action, and were rejected; for had any substance, whether of medicine or aliment been admitted, it would probably have interrupted the union of the divided parts in the first instance, or afterwards, by the action necessary for its expulsion through the pylorus.

“The liquid contents of the stomach had

* This was in the September twelve months following, as the paper is dated November 15, 1785.

been chiefly discharged by the external wound, though part of them must, no doubt, have passed into the cavity of the abdomen, and have been afterwards absorbed ; but the wound of the stomach collapsing, the barley and indigested meat were left, which increased the irritation, and occasioned the uneasiness and sense of weight he complained of, and which was, in a great measure, removed by the vomiting that took place upon his drinking the warm water.

“ He felt some relief after the retention of the first clyster, but at that time his strength was so reduced, and the symptoms were altogether so unfavourable, that neither himself, nor those who saw him, entertained any hopes of his recovery. It is indeed surprising what an extreme debility took place immediately after the accident, which could only arise from the nervous influence and general sympathy with a part so essential to life.

“ The accident that happened on the fourth day, induced me to persevere in the mode of treatment we had adopted. Indeed there was great encouragement to continue it, as the broth clysters, were not only retained, but there was a proof of an absorption having taken place, by the secretion and evacuation of urine, which then began to be consi-

derable. It is a generally received opinion, that clysters seldom pass beyond the valve of the colon: the contrary has indeed been observed in the volvulus or iliac passion, but in that case the natural action of the intestines is inverted, and a violent degree of anti-peristaltic motion prevails; in this case, however, the broth was thrown up in a very gradual manner; and though, perhaps, it did not pass the valve of the colon, in the first instance, I am inclined to believe, from the sudden manner in which the absorption was afterwards carried on, that a gentle degree of anti-peristaltic motion took place, whereby it (the broth) was impelled to the smaller intestines; this will appear less surprising, when we consider, that, in the natural action, the first impulse is communicated by the stomach, in discharging the digested aliment at the pylorus, and continued through the intestines in determining the fœculent matter downwards: but here the natural action was suspended, the stomach was at rest, and there was no foreign matter to be discharged.

“The advantages to be derived from throwing up a supply of fluid, and supporting nature in this manner, in particular cases of morbid affections of the digestive organs, will readily occur to the attentive practitioner.”

Wounds of the Intestines.

In operat-
ing for
herniæ.

In a small wound of the intestine, which I witnessed in strangulated hernia, under the operation, I pinched up the opening with a pair of forceps, and tyed a thread around it; I then passed up the intestine to the mouth of the hernial sac, leaving the ligature to hang from the wound, and the patient recovered, but he had severe symptoms for several days.

Large
wounds.

In a more considerable wound of the intestine, I should make an uninterrupted suture, and return the intestine into the abdomen, letting the end of the ligature hang from the external wound, which I should otherwise close with great care. I well know, that in experiments on animals, the ligature has been cut off close to the intestine, which has been returned into the cavity of the abdomen, and the external wound has been afterwards closed, so as to leave the ligature to separate into the intestine. Now I do not clearly understand that this plan, in any way, adds to the patient's security; but, on the contrary, it increases his danger in my opinion, if the process of adhesion be deficient.

In the treatment of these wounds, it is Treatment. right, if the wound be in the small intestines, to keep the patient without food, and support him by clysters of broth, &c. If it be in the large intestines, after a few days, a little jelly may be allowed. Perfect quiet is to be observed; and, if there be much tenderness of the abdomen, leeches should be applied.

Ruptures of the intestines from blows are more frequent accidents, arising from kicks of horses, falling upon projecting bodies, &c. Rupture of intestine. The symptoms are, great depression, coldness, and paleness; the pulse is scarcely to be felt if the laceration be large, and the patient dies in from twelve to twenty-four hours after the accident, quite sensible to the last moment of his existence.

But if the laceration be small, the symptoms are less violent; there is coldness, tension of the abdomen, vomiting, costiveness, and not the least disposition for food; there is subsequently great abdominal tenderness and great enervation.

A patient was brought into Guy's Hos- Case. pital, under the care of Mr. Forster; the man had been working in a gravel-pit, when the gravel fell in upon him. He vomited, his abdomen became tense, and as he made scarcely any urine, the case had been thought

to be retention of urine. The man died six days after the accident, and, on examination after death, a rupture was found in the intestines.

Treatment. The treatment in these cases, is perfect rest, to prevent any disturbance of the adhesive process, to apply leeches and fomentations to the abdomen, to avoid giving any medicine, and to check the desire of friends in giving food for several days after the accident.

Sometimes recovered from. The intestines thus remaining for a length of time at rest,* and inflammation being kept within the adhesive bounds, I have seen (what I believe to have been) cases of this injury recovered from.

Wounds of the Liver.

Case. I have seen deep stabs, with a pen-knife, in the situation of this organ, recovered from, after great inflammation in the abdomen. The patient was bled generally, and by leeches, and fomentations were employed. Adhesive plaister had been applied to the stabs, and on its being removed, a bloody serum was discharged from the wounds.

* The peristaltic motion is greater or less as the intestines are full or empty.

Wound of the Gall Bladder.

Mr. Edlin, of Uxbridge, informed me of ^{Case.} the following case:—Two soldiers quarrelled, and one struck the other with his bayonet in the right side, just below the margin of the ribs. The wounded man directly fainted and fell; when he recovered from his fainting state, he complained of agonizing pain in his abdomen, which became extremely tense and tender to the touch. In thirteen hours the man died; and, on examination of the body, the gall bladder was found to have been penetrated by the bayonet, and bile was extravasated into the abdomen. Mr. Edlin said, that wherever the bile rested, the peritoneum was highly inflamed,

Wounds of the Spleen.

Although this organ may be removed from the body, without the destruction of life, as is known from the case of the soldier, mentioned by Dr. Gooch, and by numerous experiments on animals, yet a very small wound of it is sometimes destructive of life; the best example of which I shall give in the following case:—

Case.

A lieutenant of a press-gang was attempting to press a man, who resisted with much violence; a scuffle ensued, and the lieutenant struck the man with his dirk, which entered near the ensiform cartilage, and its blade was nearly buried in the body. The man was brought to St. Thomas's Hospital, pale and extremely depressed, his abdomen became tense, and he died. Upon examining his body, it was discovered that the dirk had passed from the ensiform cartilage, under the margin of the chest into the abdomen, on the left side, and that its point had penetrated the concave surface of the spleen; the cavity of the abdomen was filled with fluid blood.

Wounded
in tapping.

It is said, that the spleen has been often wounded by the trochar, when tapping was performed on the left side, which, under enlargement of this organ, might happen.

Ruptured.

I have several times known the spleen ruptured by carriages going over the abdomen, and once by the horn of an ox. Each of these cases proved fatal.

Case.

Twice have I known the spleen torn from its natural attachment to the diaphragm. The first instance, was in a patient of Drs. Babington and Letsom, a Miss Harris, who, having vomited violently, discovered soon after a swelling at the groin, and at the

lower part of the abdomen. I was asked if it was hernia, and I declared it was not. She died after a week, vomiting constantly the liquids which she swallowed. When the abdomen was opened after her death, the swelling was found to arise from the spleen, which had been detached from the diaphragm, and was enlarged by the interruption to the return of blood from the veins, although the artery still contained blood. The spleen was turned half round on the axis of its vessels.

The other case was that of a gentleman Case. who was hunting in Surrey; he fell from his horse when going at full speed. He died the following day, or the day after. Dr. Pitt, who attended him, examined the body after death, and found the spleen torn from the diaphragm.

In wounds or ruptures of the spleen, Treatment. I believe nothing can be done. If the case could be accurately ascertained, pressure by a roller on the abdomen would be the best treatment.

Wounds of the Kidney.

A wound of this organ is not fatal.

A Boy called at my house, and showed Case. me some chalky concretions which he had

coughed up from his lungs or bronchial glands. I said, "How long have you been subject to this complaint?" He answered, "Ever since I have passed blood with my urine." I asked him to explain himself further, when he told me, that when quarrelling with another boy, he had been struck with a penknife in his back; that almost immediately he wished to make water, when he passed a large quantity of blood. This continued for several days, but subsided by his remaining quiet in bed. The recumbent posture is in such a case the very best security.

Wounds of the Bladder.

Danger
from state
of bladder.

These are dangerous, or not, as the bladder is full or empty, when the injury is inflicted. If full, urine is extravasated into the abdomen, or extensively into the cellular tissue, and death ensues. If empty, or nearly so, the danger is greatly lessened.

The bladder is sometimes ruptured when the above observations are applicable. The cause of its laceration is generally a fracture of the pubes.

Treatment.

The treatment of these cases, consists in leaving a catheter in the bladder, and enjoining perfect rest.

Wounds of the Chest.

These are also of two kinds:—First, Of two kinds. Wounds of the parietes. Second, Wounds of the viscera.

Wounds of the parietes are not attended Of parietes. with much danger.

A boy fell from a tree upon some pales, Case. which entered his chest between the seventh and eighth ribs, tearing his intercostal muscles freely. The air rushed violently into his chest at each respiration, and was again expelled, when the anterior surface of the lungs appeared at the wound. The edges of the wound were brought together by adhesive plaister, a roller was applied tightly round the chest to confine the motion of the ribs, and he was bled very freely. He did extremely well.

A man was brought into St. Thomas's Case. Hospital who had been stabbed between the cartilages of his ribs, he bled very profusely, and I thought the internal mammary artery was wounded, but the bleeding soon subsided, and he recovered.

Treatment in wounds of the parietes of the chest, is to promote as much as possible the adhesive inflammation to close the wound externally.

Hæmorrhage. If there be bleeding from the intercostal artery, the finger should be pressed upon the orifice of the vessel, until the disposition to hæmorrhage ceases.

Case. A man died in Guy's Hospital, who had been wounded through the intercostal muscles with an iron spindle, the wound healed, but tetanus supervened, of which he died. Upon inspecting the chest after death, the lung was found to have assisted in closing the wound, by adhering to the injured pleura.

Of Wounds of the Lung.

Symptoms. When this happens, the circumstance is known by the patient's coughing up florid and frothy blood; by free bleeding from the wound, if sufficiently large to permit its escape; by considerable irritation and tickling in the larynx, and by dyspnea.

Danger of. Danger in three ways results from wounds of the lung. First. From hæmorrhage, if any large branch of the pulmonary artery is wounded. If the vessel be wounded by a sword or knife, it bleeds very freely; but, if by a broken rib, very little, as it has the nature of a lacerated wound.

Treatment. In either case, the patient must be freely

bled, to prevent the continuance of the hæmorrhage from the wounded lung, and the opening must not be closed in the parietes until all bleeding from the lungs have ceased, otherwise the blood will remain in the cavity of the chest, and produce irritation and inflammation.

The second danger is from inflammation of the lung, and effusion into the cavity of the pleura. The first is to be guarded against by large and repeated bleedings, determined by the dyspnea and hardness of the pulse; but there is little danger of bleeding too much in one of these cases, as it is an object not only to diminish the force of the circulation, but the quantity of the blood in the pulmonary vessels.

Danger
from in-
flammation.

If effusion follows, it is the result of neglected inflammation, or of having closed the external wound too early. In the one case, it is a purulent secretion; in the other, a bloody serum, which produces the dyspnea some days after the accident.

For effusion into the chest, it is right to perform the operation for paracentesis of the thorax, to draw off the pus or bloody serum which has collected in the pleura. The mode of doing this has been already described.

Operation
for effusion.

In old persons, there is great danger in fractured ribs with wounded lung, and I

Effusion in
old persons.

always give a guarded opinion, for I have seen several die from effusion of fluid into the cellular tissue of the lung. The greatest care and quiet are therefore required in such a case, and it is better to give digitalis than to bleed very largely.

Emphysema, the third consequence of wounded lung, is less dangerous than the others. It sometimes extends to the face, covering the neck, and also a large part of the trunk.

Treatment. In the treatment, a bandage is to be placed so tight around the chest, as to prevent any rattling during a deep inspiration; the patient is to lie on the wounded side, and punctures may be made into the cellular tissue, where it is much loaded, but not so large as the wound made in bleeding.

In all cases of wounds of the chest or lungs, rest is essentially necessary to recovery.

Of Wounds of the Pericardium.

Case. Mr. Saunders told me the following case, which occurred whilst he lived with Mr. Hills, of Barnstaple. Mr. Hills was called to attend a man, who, in a quarrel, had been wounded by another with a reaping hook

through the cartilages of the ribs. The wound was small, but deep, and the man had the appearance of one who had sustained a dangerous injury. In two or three days after, he had much pain in the region of his heart, a quick and small pulse; and in a few days more, he began to swell, and could not lie down in bed. I forget exactly how long he lived, but I think for a fortnight or three weeks; and after his death, it was discovered that the hook had passed through the cartilages of the ribs into the pericardium, in which there was an effusion of bloody pus.

Wounds of the Heart.

These wounds rarely occur, but in their consequences are so immediately fatal, as to preclude the possibility of affording relief. Two cases, however, of much interest, I have known, and of one there is a preparation in the museum of St. Thomas's Hospital. I will relate them.

The first case is related in the second volume of the "Medico Chirurgical Transactions," and was sent to me by Mr. Featherton, who attended the patient.

"Richard Hollidge, a private in the North-Case.
ampton regiment, while on duty on the 29th

of March, 1810, with an unfixed bayonet in his hand, slipped down, and his bayonet entered his left side, between the sixth and seventh ribs, upon the superior edge of the latter. He was some yards distant from the gate at which he was posted, and being challenged, he returned to open it, with the bayonet still remaining in the wound; he was incapable of withdrawing it himself, but the person coming in extracted it for him. I was called to him within five minutes of the accident; he was then in a state of syncope, the extremities cold, and his pulse scarcely perceptible. In about the space of a quarter of an hour, he gradually revived, did not complain of any severe pain, and expressed, 'that he believed he was more frightened than hurt.' I examined the wound with much diligence, but could not trace its extent further than one inch and a quarter, though it was evident that the bayonet had penetrated two inches: the hæmorrhage was very inconsiderable. His wound was dressed; he was conveyed to the military hospital, and put to bed; he was incapable of lying on his right side, but slept tolerably well. On visiting him the following morning, he complained of lancinating pains extending from the wounded part across the chest, and of severe fugitive pains in different parts

of the abdomen; his pulse was quick and thready, and tongue white and dry. These symptoms led to a suspicion, that the pleura costalis at least was wounded, though no opening could be ascertained extending into the cavity of the chest. 3xvj. of blood were taken from his arm, a solution of sulphate of magnesia administered, and fomentations applied to the abdomen. He was obliged to be supported in bed nearly in a sitting posture, as respiration became much impeded when perfectly horizontal: in this position he appeared to breathe with freedom. In the evening, he expressed himself in every respect much relieved; his pulse was less quick, and had lost its thready sensation; tongue more moist; his medicine had operated moderately. On the following morning, I found he had passed a good night, his pulse was calm and steady, scarcely quicker than natural, and the tongue quite moist; the lancinating pains had subsided, and he merely complained of a trifling pain in the wounded part; this was increased by a slight cough, with which he became affected only this morning, and which was unattended by any expectoration. His aperient draught was repeated, an emulsion ordered for his cough, and the antiphlogistic regimen strictly adhered to. Throughout the day he was

walking about the ward, in very good spirits, quite jocular in his conversation with his fellow patients, and expressed himself to them, that 'low diet would not do for him any longer.' He retired to rest about nine o'clock, and fell asleep; at eleven, he got out of bed to the commode, had an evacuation, by no means costive; said, 'he felt himself chilly, and a sensation that he should die;' returned to bed, and expired immediately; forty-nine hours from his receiving the wound.

I examined the body on the following morning, in the presence of two other surgeons. On opening the chest, the pleura was found slightly inflamed for some distance round the puncture, and an effusion of adhesive matter, emitting a small portion of the lung to the wounded part; the lung was not injured. At least two quarts of blood were effused into the cavity of the chest; the pericardium was nearly filled with blood, and had a puncture through it, extending three quarters of an inch into the muscular substance of the left ventricle, about two inches from its apex. A small coagulum was formed at the edge of the wound through the pericardium.

Upon opening the left ventricle of the heart, it was discovered that the bayonet had

penetrated the substance of the ventricle, and had cut one of the fleshy columns of the mitral valve.

On a review of the case, I conceive it very curious, that an organ like the heart, possessing such excessive irritability, a point to which the most interesting of our sympathies are referred, and which is in some degree influenced by the most trifling, should be so materially wounded, and yet the system take so little cognizance of the injury. Death, in this case, it was perfectly evident, was not produced from any alarm excited in the system by the wound, but occurred as a secondary consequence, from the hæmorrhage increasing to such an extent, as to interrupt the actions of the heart and lungs. That the hæmorrhage proceeded chiefly from the heart, must be admitted: there was no symptom whatever that indicated a wound of the lung; none could be found on the most deliberate examination; and the intercostal artery was entirely free from injury."

The second case has been published in the "Medical Records and Researches," from which the following particulars have been taken. It occurred during the time that Dr. Babington was employed as assistant surgeon at the Royal Hospital at Haslar,

and by him the particulars were communicated :—

Case.

“ Henry Thomas, a marine, was received into the hospital, from his Majesty’s ship *Foudroyant*, having a wound in his side. He had slipped from the gangway, where he had been placed as sentinal, to the deck below ; and had fallen upon the point of his bayonet, which had penetrated his side a little below the false ribs, nearly in a perpendicular direction, as far as the hilt of the instrument. Immediately after the accident he drew out the bayonet without assistance, arose, took up his musket, walked eight or ten steps, and then dropped down in a fainting state ; from this state he soon recovered, and was taken to the hospital about two hours after the receipt of the injury ; he then complained of but little pain, was inclined to sleep, and when roused appeared in great distress. The wound was on the left side, about two inches above the ilium, and communicated with the cavity of the abdomen ; but neither its direction nor depth could be ascertained. His body was cold, his pulse scarcely perceptible, but he had not apparently lost much blood. A portion of omentum, about 3ij in weight, protruded through the opening, this was cut off. A purgative enema was thrown up, which

procured a motion, without any appearance of blood. He drank freely of coltsfoot tea, and took his medicines ; the fluids produced nausea, and attempts to vomit, but he did not eject any thing from the stomach. The breathing was at first slow, but free, by degrees it became more oppressed, and at length grew extremely quick and laborious, attended with a sense of weight on the right side of the thorax, which threatened suffocation. The expectoration was not bloody. Soon after the injury he began to complain of a pain in the chest, and at the pit of the stomach, which gradually increased, and towards mid-night became almost insufferable. The upper part of the thorax had swelled a little, and the motion of the right arm much increased his sufferings. This tumefaction gradually augmented, and at eleven o'clock had reached the head and face ; it subsequently extended all over the body before his death, which took place a little after two o'clock in the morning, apparently from strangulation. He retained his senses to the last minute.

“On examining the body twelve hours after death, the following appearances were discovered :—

“The triangular wound from the bayonet, was seated on the left side, midway between

the spine and the linea alba, having the last rib and the crista of the ilium at equal distances above and below it, it readily admitted the point of the finger. A portion of omentum still protruded, and appeared gangrenous. The direction of the wound was obliquely upwards and inwards, and had penetrated the following parts:—the integument, abdominal muscles, peritoneum, the colon near its termination in the rectum, again at its arch; the stomach inferiorly, two inches from the pylorus, and superiorly, under the left lobe of the liver, which was also wounded; the diaphragm in the centre of the tendon; after this the pericardium; the right ventricle of the heart in two places, first the inferior part, and again near the tricuspid valve; next the lungs were pierced; and last the anterior parietes of the right side of the thorax, between the cartilages of the second and third ribs, terminating in the substance of the pectoral muscle. The abdomen contained a little bloody serum; the pericardium a small quantity of blood; but the right cavity of the pleura had about two quarts of blood within it.

“Although so many parts of importance were injured, but little was indicated of the extent of mischief from the symptoms which occurred during life. Thus the colon was

twice perforated, but the stools were not tinged with blood, nor was there any fœculent matter in the cavity of the peritoneum. The stomach was also twice wounded, and yet vomiting did not take place, excepting once slightly, as he was brought to the hospital. The liver was opened to the extent of one inch, but yielded scarcely any hæmorrhage. The heart had been pierced in two places, but yet its action continued regular, and supported circulation for above nine hours. The middle and upper lobes of the right lung were both wounded; yet he did not cough up any blood. The emphysema had originated under the pectoral muscle, and had gradually extended over the whole body,"

Wounds of the Throat.

Attempts to commit the act of suicide are the usual causes of these injuries, and usually one of the following parts suffer:—
The pharynx, the larynx, the trachea, or the œsophagus.

If the chin be a little elevated, its distance from the sternum is about nine inches. First. Three inches below is the thyroid cartilage, and the space has the muscles of

Parts
injured.

Description
of parts.

the os hyoides and tongue on the fore part. Second. In the middle division is the larynx, with the pharynx behind it. Third. In the lower part is the trachea before, and the œsophagus behind. On the sides of these parts are situated the carotid arteries, which are divided near the os hyoides. The internal jugular veins are also placed laterally. The pars vaga accompany the carotid arteries, and the grand sympathetic nerves are found somewhat nearer the vertebræ.

Of the Wound above the Larynx.

This is the most frequent seat of injury, which is inflicted whilst the chin is elevated.

Symptoms. Through the wound, air and blood issue with frightful impetuosity, more especially when the patient coughs. A lighted candle brought near the aperture is immediately blown out, and liquids, when attempted to be swallowed, are violently ejected from the wound. Hence, those ignorant of the structure of the parts, suppose that the air tube is injured, but the anatomist is aware that the wound has passed through the muscles of the jaw and tongue into the pharynx, being

generally inflicted between the chin and os hyoides.

The arteries which bleed freely, are the sublingual, that pass just above the os hyoides on each side to the tongue; but sometimes the external carotid arteries are divided, when, from the rapid hæmorrhage, death is almost immediate. Arteries wounded.

Treatment.

The wound is generally in itself but little dangerous; and when persons die shortly after its infliction, it is frequently from the fever which has led to the commission of the act, if it be not from hæmorrhage.

Position in this wound is to be carefully attended to. Position. If the chin be elevated, the wound gapes widely; but when the chin is depressed, the frightful aperture becomes closed; the head should therefore be brought down towards the chest, and confined in that position, in order to prevent a separation of the edges of the wound.

I have generally put three sutures in the integument only, the more effectually to guard against any disturbance of the approximated edges, which may otherwise, from the constant motion of the patient during Sutures.

irritability or delirium, be produced. Such sutures, through the integument only, are in this respect very useful, and are not ever disadvantageous.

Enema.

The patient's mouth and tongue should be kept cool and moist, by the application of a portion of lemon dipped in water; but he should be chiefly supported by clysters of broth and gruel, to which opium should be added if they quickly return; and when the fever has subsided, the addition of port wine should be made.

I knew a lady who had a stricture in her œsophagus, who was supported forty-five days by clysters of broth and wine, when she could not swallow even a drop of water.

When food is given by the mouth, a small quantity of solid matter excites less irritation than fluid; and a small portion of jelly is the best.

The sutures should be removed in a week, and adhesive plaister be substituted for them.

When the wound is situated below the os hyoides, as it sometimes is, the epiglottis is injured at its junction with the thyroid cartilage.

In a case of this kind to which I was called at Walworth, I put a thread through

the frœnum, on the dorsum of the epiglottis, and fixed it again to the thyroid cartilage. The man recovered; but whether it was a post hoc, or a propter hoc, God knows! In general, these cases are fatal, in which the epiglottis is separated from the thyroid cartilage, from a want of defence to the air tube.

Of the Wound into the Larynx.

This wound is either into the thyroid or cricoid cartilages, or into the ligament which unites them. Symptoms.

The air rushes out through the wound in expiration, and violently in coughing, and is also inspired through it. The person is not able to speak, unless the aperture be closed by pressure; but the food does not pass out from it.

A wound confined to the cartilages of the larynx, or to the ligament uniting them, is not dangerous, and by far the greater number of these cases, which I have seen, have done well. The treatment of them consists in approximation of the parts by position, and in the application of adhesive plaister to retain the edges in contact.

When the wound is inflicted with excessive violence, or by a stab, the pharynx may be wounded, as it is situated behind the larynx, and then the treatment of the wound is to be similar to that of the wound above the larynx.

Case. In a case of this nature, which was under the care of Dr. Ludlow, of Calne, he informed me that the thyroid cartilage, which was many weeks in healing, became ossified, and that portions of it exfoliated.

Case. In a patient of mine in Guy's Hospital, the wound upon the thyroid cartilage remained fistulous, and I raised a piece of skin from the surface of the neck, above the opening, and turned it over the opening, the edges of which I had previously pared: it united extremely well.

Of the Wound below the Larynx.

When the wound is inflicted within three inches of the sternum, it is more dangerous than in any other situation. The trachea is here on the fore part, the œsophagus behind, and the carotid arteries are situated close to the trachea, more especially the right. The thyroid gland crosses the upper part of the trachea, and its veins cover the fore part.

Symptoms. If the trachea be cut, the air rushes

through the wound both in expiration and inspiration. The blood gets into the trachea, and excites a violent coughing, by which a bloody froth is forcibly ejected, but the food or liquids do not pass out through the aperture.

The external opening, in these cases, is generally small, as the wound often arises from a stab, and the consequence is, that the blood does not freely escape, but lodging in the bronchia, adds excessively to the dyspnea.

In the treatment, the first object is to stop Treatment. the bleeding; and if the wound be not sufficiently large to lead to the easy discovery of the source of the hæmorrhage, an incision should be made, in a longitudinal direction, to expose the mouths of the vessels. If the trachea be widely opened, pass a needle and ligature through the cellular tissue, upon its surface, which, from its firmness, will support the ligature, and thus bring the edges of the aperture into contact; but do not penetrate the trachea itself with the needle. Thus securing the trachea, bring the edges of the external wound together by bending the head forwards; but do not apply adhesive plaister, as it prevents the escape of air and blood in coughing, produces additional difficulty of breathing, and occasions emphysema.

The ligature upon the cellular covering of the trachea, is to be separated by the ulcerative process, which will generally be effected in a week.

A transverse wound in the trachea, will be followed sometimes by a loss of voice, on account of the division of the recurrent nerves.

If one of the carotid arteries be opened, death is usually so instantaneous, that the patient cannot be saved. If a surgeon were present, or the wound was very small, and he could reach the patient before he expired, he should thrust his finger into the wound, to stop the flow of blood, and then cut down upon the vessel, to expose it sufficiently, to place a ligature upon it, which he can afterwards better adjust.*

When the trachea is deeply cut, the œsophagus is sometimes wounded; and, if the injury be extensive, death will generally ensue; but a stab into the œsophagus, or a small wound, may be recovered from.

After an injury of this kind, the wound into the trachea is to be treated as in the former instance, but which that in the œsophagus will be best approximated; all food, liquid or solid, must be avoided, and the patient is to be supported, as long as

* See case of wounded carotid.

nature can bear it, by clysters. I object entirely to the introduction of tubes into the pharynx and œsophagus, as worse than unnecessary; for they are highly injurious by the cough which they occasion, by their irritating the wound; and, if adhesion or granulation have taken place to close the wound, such tubes tear it open again and destroy the process of restoration.

LECTURE XL.

Of Wounds of Joints.

THESE accidents are but trivial, or very dangerous, as the surgeon is directed by proper principles, or is ignorant of the treatment which they require.

Improper
treatment.

If the patient has a poultice applied, or if the utmost attention be not paid to the immediate closure of the wound, inflammation of the synovial membrane arises, and suppuration ensues. The most violent constitutional irritation succeeds,—shivering, heat, flushing, and profuse perspiration; generally, great swelling and excessive pain in the joint. Abscesses form in different parts of the joint, one succeeding another, until the strength becomes exhausted.

In young
or old per-
sons.

In young and healthy constitutions, these wounds in the largest joints are recovered from; but, in aged and weak persons, they destroy life.

Dissection
of.

Upon dissection in the first stage, suppurative inflammation of the synovial membrane is found; in the second stage, the ligaments of

the joint are thickened, and the synovial membrane in part ulcerated, in part granulating. The cartilages are absorbed; granulations arising from some parts of the bones, and exfoliation taken place from other portions.

Recovery from these injuries, when inflammation has followed, is by adhesion, so as to destroy the synovial surface; or else by granulation, when a partial or general ossific anchylosis is the result. Anchylosis.

All these effects may be prevented by an intelligent surgeon. When called to treat a wound of from one to two inches extent into the knee joint, he will, with a fine needle and thread, passed through the skin only, (avoiding the ligaments,) bring the edges of the external wounds together; for a wound in the joint is different to most others, as the synovia has a constant tendency to force a passage outwards, and it is more abundantly secreted than usual, so that adhesive plaister is apt to be separated, and union prevented; he will apply, therefore, lint dipped in blood over the surface of the wound, and place the plaister over it; then cover the surface of the knee with soft linen, dipped into a lotion of the liquor: plumbi subacet: and spirit. Afterwards he will place a splint behind the limb to prevent all motion Treatment.

of the injured joint, and enjoin positive rest.

Purgatives should be as much as possible avoided, and a rigid abstinence enforced. In eight days, the threads may be cut and drawn away, but the adhesive plaister and lotion should be continued. Three weeks should elapse before the patient be allowed to quit the bed.

If inflammation follow a wound into a joint, leeches and an evaporating lotion must be employed; and if it run high, the patient should be bled freely from the arm.

If suppuration be produced, fomentations and poultices are required locally; liquor: amoniæ acet: and opium internally.

A fungus granulation forms at the wound, which must not be disturbed, as it is formed by nature to close the aperture; fresh irritation is produced by disturbing it.

When a limb is stiff from inflammation and adhesion, early motion of the joint is required, and its use may generally be restored. A joint thus circumstanced is not injured, but benefited by motion, whilst in a chronic or scorfulous inflammation of a joint, rest is most essential to its cure. In this case, therefore, a patient should not only use the limb in common exercise, but he should set upon a high table, and employ the muscles, for

some length of time at once, in flexing and extending the limb.

Partial ankylosis, when the joint is not altered in form, may, in young persons, be considerably relieved.

Where ossific granulations have arisen from every part of the surface, permanent and complete ankylosis must be the result.

In removing loose cartilages from joints, it is proper first to draw down the skin to render the aperture afterwards valvular. The cartilage is fixed by an assistant, an incision is made over it, after the skin has been drawn an inch to one side, then as soon as the surface of the cartilage is well exposed it jumps from its situation, the skin is let go, and then no direct opening remains communicating with the joint.

Removal of
loose carti-
lages.

The after treatment is the same as in simple incised wounds, only a suture is not required.

Wounds of Tendons.

The division of the tendo achillis is most frequently occasioned by a wound from an adze, and sometimes the injury arises from accident with a scythe.

Tendo
achillis.

In whatever way it is produced, the immediate effect of the division of the tendon is

Effects of.

a great separation of its divided portions, the upper one being drawn up by the action of the gastrocnemei, and a falling of the heel, the foot being influenced by opponent muscles. Sometimes the posterior tibial artery and nerve are also divided with the tendon; where the surgeon should secure the former by a ligature as soon as possible, or else apply a tourniquet.

Mischief of. The mischief arising from this accident depends in a great measure upon the treatment which may be adopted. If the edges of the wound be not approximated, and if the ends of the divided tendon are allowed to remain at a distance from each other, inflammation arises, granulations are produced, and a union of the ends of the tendon takes place to the surrounding parts, destroying permanently the action of the muscles, and the motions of the tendon. But if the wound be united by adhesion, and the ends of the divided tendon brought into contact, or nearly so, the motions of the foot are generally restored.

Treatment. The principle in the treatment is to approximate the ends of the tendon by raising the heel, extending the foot, and bending the knee; the external wound is then to be carefully closed, in order that it may be healed by the adhesive inflammation. To effect this, a shoe with a heel one inch and a half in

height is to be placed on the foot of the injured limb, and a strap is to be carried from the heel of the shoe, to the calf of the leg, then a roller is to be lightly applied upon the upper part of the leg, to confine the strap and to keep the foot extended. The edges of the external wound are to be brought together by a small suture, and all pressure at the part should be avoided, only an evaporating lotion being placed upon it. The patient is to be confined to his bed until the wound be healed, and then he may be allowed to walk a little with a high heeled shoe. This shoe is to have the heel gradually lowered until it becomes of the same thickness as the heel of the shoe worn on the sound side. By this means, the muscle which had contracted, and the tendon which had been injured are gently brought to their proper action.

If the divided extremities of the tendon are allowed to remain separate during the union, an addition is made to the tendon in its length, and the power of the muscle acting upon it is thus reduced.

Should much inflammation arise during the cure, the limb must be elevated to prevent all gravitation of blood, and leeches should be applied near the wound.

If the extensor tendons of the fingers be divided, the fingers should be kept extended

Division of
extensor
tendons.

during the cure, by a splint placed under the hand and fingers. Indeed it is only necessary to consider whether the divided tendon, in any case, belongs to a flexor or extensor muscle, to know what is to be done to assist its union.

Punctured Wounds of Tendons.

Dangerous. These are dangerous accidents, being often productive of tetanus. Several times within my knowledge, this has occurred from persons treading upon a nail, which has penetrated the shoe, and wounded the tendinous aponeurosis of the sole of the foot; also an accident of a somewhat similar nature to the palm of the hand, I have seen productive of a similar effect.

Tetanus. Tetanus seems to be the result of a wound of a structure difficult to heal, and requiring great constitutional efforts to produce the effect; and these efforts in a very irritable constitution produce the highest nervous excitement.

Treatment. In these injuries, I have observed that it is best to foment and poultice the parts, so as to sooth and tranquillize them; also to carefully avoid depletion, even from the first to any great extent, either locally or constitutionally.

The patient should be allowed his common diet, and if he be restless or complain of much pain in the wound, opium should be given. Lowering the patient only adds to his irritability.

Of Laceration of Tendons.

The tendo achillis, and sometimes, but not so frequently, other tendons are torn through. Of tendo achillis.

This accident to the tendo achillis is produced either by a violent effort of the muscles as in jumping or dancing, or by an unexpected extension of the tendon ;—as for instance, by treading unawares with the toe only upon an elevated substance. Dr. Curry, late physician to Guy's Hospital, informed me that he tore his tendo achillis by catching his toes upon a scraper, when walking in a dark street ; being at the time unprepared for such an occurrence.

In whatever way the accident may be produced, the treatment required will be to extend the foot, and bend the knee to allow the ends of the lacerated tendon to approximate. Treatment.
In this way the tendon soon unites by the adhesive process, and the use of the limb is afterwards gradually restored. Some degree of thickening of the tendon for a long time

remains, and the patient halts a little in rapid motion.

The position of the foot and leg is to be maintained in the same way as when the tendon is divided by incision, and an evaporating lotion should be employed. After the union, the same precautions are to be observed with respect to the employment of the high heeled shoe.

*Of Partial Laceration of the Tendo Achillis
and Gastrocnemeus Muscle.*

Cause of. A person in running or walking fast, or if his foot slips backwards when it has been advanced, sometimes feels as if he had received a severe blow upon the back of his leg, and is immediately unable to walk, but with the greatest difficulty, and with the foot extended.

The cause of this feeling is a laceration of some fibres of the tendo achillis, or of the gastrocnemeus muscle, where it joins the tendon. There is great tenderness upon pressure on the following day, with some ecchymosis, which daily increases, until the limb becomes considerably discoloured. The least attempt to bend the foot is accompanied with great pain, and followed by swelling of the leg and ancle.

From a belief that the injury is slight, and from negligence in treating it, the lameness which results from this accident is often of very long continuance; but, if properly attended to from the first, it is in general soon recovered from.

A similar treatment to that recommended for division or laceration of the tendon, is requisite for the cure of this injury, and when the patient can bend the foot without producing pain, then the high heeled shoe must be worn, and the heel be gradually lowered, as in the previous cases.

From three to six weeks are required to effect a cure in.

Of Wounds of the Nerves.

The immediate effect of the division of a nerve of a limb, is the loss of volition in those muscles to which the nerve is distributed, and the antagonist muscles being unopposed, gradually contract. If the nerve supplying the flexors is divided, the limb becomes extended; if that distributed to the extensors is separated, the opponent muscles keep the extremity flexed. This arises from the tendency a muscle possesses to occupy the smallest space possible, and

Effect of.

which differs from voluntary or involuntary contraction, as the latter can only continue for a time; but the former is permanent, or as long as the antagonist muscles are paralysed.

The second effect of the division of a nerve is the diminution of sensibility; I call it diminished, because I do not find that the division of the branch of a nerve, although it benumbs the parts, entirely deprives them of sensation.

In the division of the infra orbital nerve, or of one of the nerves of the fingers, some sensation remains, but numbness is produced; when, however, all the nerves passing to an extremity are divided, sensation is entirely destroyed.

Case.

I once saw a case, in which one of the branches of the median nerve was divided in the palm of the hand; and if pressure was made on the radio spiral nerve at the elbow, it produced a tingling sensation in the benumbed finger.*

The temperature of the part to which the nerve is distributed, if it be covered so as to prevent the access of a colder medium, is greater than that of parts similarly covered;

* It appears, therefore, as if nervous influence is supported in a degree by anastomosis.

but if it be left altogether bare, it then has less power of resisting diminished temperature than the surrounding parts. I have seen severe chilblains, and during the winter, incurable ulceration follow the division of the median nerve.

When a nerve has been divided, if its extremities are brought together, it unites, and the function of the nerve becomes gradually restored.

Divided
nerves
unite.

Dr. Haighton divided the *pars vaga* on one side of the neck of a dog, and, after some time, he cut through the nerve on the other side: the dog lived, which he would not have done, had both the nerves been divided at the same time. When he had allowed time for the union of the second, he divided both at once, and the animal died under the same circumstances as would have occurred, had no previous experiment been made.

Dr. Haigh-
ton's expe-
riments.

The time required for the union and restoration of function, appears to depend upon the size of the nerve.

A young gentleman who had injured the external condyle of the *os humeri*, had numbness in the direction of the radial nerve, and he recovered the sensibility of the parts in four months.

Case.

The numbness sometimes produced by bleeding is recovered from in three months.

In a fracture of the thigh bone, by which the sciatic nerve was injured, so as to produce numbness in the limb below, the person recovered in nine months.

Case. Koschiusko, the Polish General, had his sciatic nerve injured by a pike, and when in this country, many months after receiving the wound, he had not got rid of the effects ; and I have heard since, that he remained lame.

At the place of union, after the division of a nerve, there is the appearance of a ganglion, as may be seen in a preparation I made from the finger of a person brought into the dissecting room at St. Thomas's Hospital, a cicatrix covered the ganglion.

Independent of the size of a nerve, the time in which union will be complete, must also depend much on the position and approximation of the ends.

Treatment. In the treatment of a wounded nerve, the only objects are the approximation of its ends and union by adhesion.

Many bad symptoms have been attributed to the partial division of a nerve ; but I have, in part, cut through the sciatic nerve of a dog, without producing any other symptom than partial paralysis.

Case. I removed from the median nerve, a tumor for a gentleman, and took away two

thirds of the nerve with it, and numbness with tingling were the only unpleasant symptoms following.

A Mr. H. called at my house, who had a Case.
partial division of the median nerve, affecting the fore, middle, and ring fingers, but not the thumb; he had tingling with the numbness, but no other bad symptom.

A nerve divided in part, therefore, occasions tingling and numbness; one completely separated, only numbness; the treatment of the former is as that of the latter.

If a ligature be applied upon a nerve of Ligature on
a nerve.
magnitude, the consequences are sometimes fatal, and sometimes productive of lingering suffering.

Mr. Cline informed me, that in a case of Case.
popliteal aneurism, operated upon in the old way, by opening the tumor in the ham, the popliteal nerve was included in the ligature with the artery, and that the man died in a few hours.

In a case of amputation at Guy's Hospital, Case.
I saw the whole sciatic nerve included in a ligature, which was applied to suppress hæmorrhage from the artery which accompanies the nerve. In four days, the man was seized with violent spasm in the stump. On the fifth day, spasms affected the limb, and from thence extended to the

other muscles of the body. On the seventh day, he died.

If a nerve be included in a ligature, when tying an artery, the process of ulceration is extremely slow, and the slightest drawing of the ligature produces agonizing pain.

Case.

Lord Nelson suffered excessively from this cause after his limb had been amputated; and with all his heroism, he could not bear the least touch of the ligature, without uttering the most violent expressions.

After amputation, then it is right to avoid, with the greatest circumspection, any nerve, or portion of a nerve, in placing the ligatures on the vessels.

The division of a nerve, or even pressure upon the spinal marrow, so as to destroy volition and sensation, does not prevent the involuntary action of the limb or limbs from proceeding. The circulation still proceeds, and the irritability of the part remains as is shown in the application of a blister, which produces the usual vesication; also, a wound heals by the adhesive process.

Friction and electricity seem to have some influence in restoring action in a divided nerve, or of one which has partially lost its power from any other cause.

Pressure upon a nerve, occasions the

sensation of a part being asleep; striking the cubital nerve at the elbow, occasions violent tingling in the little finger, and half the ring finger.

Of Sprains.

A sprain is an injury occurring to the ligaments or tendons surrounding a joint, which are either forcibly stretched or lacerated. Definition.

It usually happens from the sudden extension of the joint in a direction which the muscles are unprepared for; in the same manner as when a dislocation is produced, only that the violence is not sufficient to occasion a displacement of the bones. How produced.

The most common situations of these accidents are either at the wrist or ankle, arising from sudden falls, by which joints are unexpectedly and forcibly bent. Common seat of.

These injuries are attended with considerable pain at the time of the accident, and the part soon becomes swollen and tender; the former symptom arises from the effusion of blood in the first instance, out of the lacerated blood vessels, and becomes subsequently much increased from inflammation; the Symptoms.

tenderness and pain are generally in proportion to the tumefaction.

At first the surface of the skin presents its natural appearance, but after a short time, as the effused blood coagulates it becomes much discoloured.

Sensation
of crepitus.

When inflammation has been set up, and given rise to effusion of fibrin, a sensation of crepitus is experienced on examining the injured part, which might, by an ignorant surgeon, be mistaken for the crepitus of fractured bone; but it never gives that distinct grating feel which occurs from the rubbing of one portion of broken bone upon another.

Motion of
joint de-
stroyed.

Immediately after the receipt of the injury, the ordinary motions of the joints can be readily performed; but as the swelling takes place, these motions become much impeded, and ultimately cannot be performed without producing acute pain, and increasing the mischief.

Treatment.

In the treatment of these cases, the first object is to arrest the hæmorrhage from the lacerated vessels, and then to prevent the occurrence of severe inflammation; afterwards to promote the absorption of the effused matter, and subsequently to restore the motions of the injured parts.

Cold and
position.

In the first instance, the application of cold

by means of evaporating lotions, and attention to the position of the limb, will effect much in arresting the effusion, and preventing acute inflammation. The position should be such as to relax those muscles which act on the injured tendons, and at the same time such as will favour the return of blood to the heart.

Should the pain and tumefaction increase in spite of these means, leeches should be freely employed over the seat of mischief, and the bleeding encouraged by tepid applications; purgatives should also be administered; and in very robust persons, when the injury is extensive, general blood letting, and other constitutional remedies must be had recourse to. Bleeding.

When the inflammation is subdued, and the patient is free from pain, still the surgeon has much to do in effecting the absorption of the effused matter, and this he should be careful to remove, as it is from neglecting this stage of the injury that other and more important disease originates, this more particularly in persons suffering from any constitutional disease, as in those affected with scrofula. After effects.

In persons free from constitutional disease, these injuries, if not very extensive, are rapidly recovered from; the effusion quickly In healthy persons.

subsides, and the motions of the joint are restored; but in no case should the patient be allowed to exercise the part as usual, until all pain has ceased, and the part has nearly regained its original form.

Too early motion.

By a too early use of the part, the effects of the injury are kept up, so that weeks, months, or even years may elapse; and the patient still suffer from them; whereas a little more attention to the disease in the first instance, would have completely removed all the suffering and danger.

In unhealthy persons.

In persons suffering from constitutional disease, a chronic form of inflammation is often set up, which terminates in suppuration, and often affects the bones, which become carious, and make it necessary for the surgeon to remove the diseased part by amputation, in order to save the patient's life.

Therefore, after the acute symptoms have been removed, be careful to get rid of all the effects of the injury before the patient be allowed to employ the limb, as previous to the accident.

Treatment of chronic stage.

Rest, position, and the use of mild stimulants, with friction and moderate pressure, are the best means of producing the desired effect. The liniment: ammoniæ;] liniment: hydrargyri; liniment: saponis, may either of them be rubbed over the affected part, night

and morning, afterwards making pressure by the application of a roller ; or the part may be enveloped in strips of one of the following plaisters:—Empl: ammon:—Empl: ammon: c hydrarg : Empl: Galbani, over which the roller should be placed. I have also known good effects produced from the pouring a continued stream of cold water on the part from a pump or large pitcher.

Should the disease prove obstinate, and be attended with occasional pain, the aid of counter irritation may with great advantage be produced, either in the form of blister, or the Ung: Antimon: Tartarizat: I have known many cases quickly cured by these means.

When the marks of disease have been removed, the motions of the parts should be promoted by moderate, but regular exercise. Exercise.

LECTURE XLI.

On Dislocations.

Definition. A **DISLOCATION** is the displacement of the articulatory part of a bone, from the surface on which it was naturally received.

I shall first make some general observations on these accidents, and afterwards describe the particular dislocations.

**Require
immediate
assistance.**

There are few accidents to which the human body is liable, that are more likely to endanger the reputation of the surgeon, than dislocations, as the restoration of the injured parts depends very much upon his decision and immediate assistance; for, if much time escape before the parts are restored to their natural positions, the reduction is rendered proportionably difficult, and may become perfectly impracticable; when the patient becomes a living memorial of the surgeon's ignorance.

**Conse-
quences of
neglect.**

I have known several instances in which the want of professional knowledge or inattention, on the part of the surgeon, to these

accidents, has been the occasion of irrecoverable deformity in his patient, and of the loss of his own professional character.

An accurate knowledge of the anatomy of the joints is necessary, to enable the surgeon readily to detect the nature of many dislocations, as also to adopt the best means of reducing them. Let me, therefore, entreat you to examine and study well the structure of the different joints, the forms of articulation, the bones and cartilages composing them, the ligaments connecting them, and the action of the muscles moving them; as, without this knowledge, you cannot practice your profession with credit to yourselves, or to the advantage of those who may come under your care.

Anatomical
knowledge
requisite.

I have known a case of fracture of the neck of the thigh bone treated as a dislocation, and the pullies applied to the limb, by a hospital surgeon, who was deficient in anatomical knowledge.

In some cases, however, so much tumefaction arises from extravasation of blood, or the parts become so tense from the effusion, in consequence of inflammation, that the best surgeon will not be able exactly to ascertain the precise nature of the injury during the first few days after its receipt; it would be, therefore, extremely illiberal

Sometimes
difficult to
detect.]

and unjust to attribute ignorance to a surgeon who might have given an incorrect opinion under such circumstances.

Immediate effects.

The immediate effects of a dislocation are, to produce an alteration in the form of the joint, in the length and ordinary position of the limb; also, after a short time, when the muscles have contracted, to destroy the motions of the joint.

At first, much motion.
Case.

In the first few minutes, however, after the injury, the degree of motion is considerable, which I had an excellent opportunity of seeing in a patient brought to Guy's Hospital, with a dislocation of the thigh bone into the foramen ovale, which had occurred only a few minutes before his admission. The nature of the injury was extremely well marked, only there was great mobility of the limb at first, but in less than three hours it became firmly fixed by the contraction of the muscles.

Limb lengthened or shortened.

In dislocation of the extremities, the limb is usually shortened; but when the femur is displaced into the foramen ovale, or the humerus into the axilla, the limbs are lengthened.

Pain.

A dull pain is felt from the pressure of the dislocated bone upon the muscles, but the pain is sometimes severe when the bone rests upon a large nerve or nerves, as when

the femur is dislocated into the ischiatic notch, or the humerus into the axilla; and, from the same cause, numbness and a partial paralysis of the limb are also produced.

The large blood vessels also, occasionally, receive much injury from these accidents. I have known the subclavian artery so much compressed by a dislocation of the sternal extremity of the clavicle backwards, as to stop completely the pulsation at the wrist. In another case, the axillary artery was so much injured by a dislocation of the humerus into the axilla, as to give rise to aneurism, for the cure of which the subclavian artery was tied.

Vessels
injured.

If there be not much extravasation or effusion, the head of the displaced bone may be easily discovered in its new situation, and may be distinctly felt to roll, if the limb be rotated. In some instances, the usual prominence of the joint is lost, as when the humerus is dislocated into the axilla, or an unnatural projection occurs, as in the dislocations of the elbow.

Head of
bone felt.

The remote effects of these injuries are,—
First. The sensation of crepitus, which occurs a day or two after the accident, from the effusion of fibrin into the joint or bursæ, although it does not give that grating feel which arises from the motion of the frac-

Remote
effects.

tured ends of a bone upon each other; yet, I have known medical men, not aware of this circumstance, suspect a fracture when none existed.

Inflam-
mation.

In general, the degree of inflammation arising from these injuries is very slight. Sometimes, however, it is considerable, causing, together with the extravasation, great tumefaction of the surrounding parts, and rendering it difficult to ascertain the nature of the injury. I have known, in a few instances, so high a degree of inflammation to follow the receipt of these injuries, as to destroy the patient.

Case.

A master of a ship who had dislocated his thigh upwards, a few days after its reduction, had extensive suppurative inflammation take place in the thigh, under which he sunk.

Mr. Howden, a surgeon in the army, has given the history of a somewhat similar case to the Physical Society of Guy's Hospital.

Dissection
of parts.

On dissecting the injured parts in those who die shortly after a dislocation from violence, the capsular ligament is found torn transversely to a great extent, and the peculiar ligaments of the joint are also ruptured, the head of the bone being removed from its socket.

In dislocations of the hip, I believe the

ligamentum teres is always torn through, or separated from its attachment, sometimes with a piece of cartilage, or even of bone.

When the humerus is dislocated, however, the tendon of the biceps, which answers the purpose of a ligament, is, as far as I have had an opportunity of witnessing, uninjured,—although I do not mean to deny the possibility of its being ruptured.

The muscles and tendons surrounding the joint are frequently much injured, as for instance, the tendon of the subscapularis muscle, when the head of the humerus is displaced into the axilla, or the pectineus and adductor brevis muscles, in dislocation of the femur into the foramen ovale.

Tendons
and muscles
injured.

When a dislocation has remained unreduced for a length of time, some degree of motion is gradually restored, but the power and mobility of the limb are never completely regained; and, in the dislocations of the thigh, the patient is ever after lame.

When un-
reduced.

In dissecting cases of this kind, the head of the bone is found much altered in figure; this alteration, however, does not depend very much upon the length of time that the bone has been displaced, but more upon the structure which the head of the bone presses on, whether bone or muscle.

Dissection
of.

If the bone
rests on
muscle.

If it rest upon muscle, the bone undergoes but little change, its articular cartilage remains, and a new capsular ligament forms around it, from the thickening and condensation of the surrounding cellular tissue.

If on bone.

If, on the contrary, it presses upon bone, an extraordinary change is produced, both in the head of the dislocated bone, and in the osseous surface on which it rests. The articular cartilage becomes absorbed from the dislocated extremity, and the periosteum of the bone on which it presses is removed in the same manner, so that a smooth hollow surface is formed, to which the head of the displaced bone becomes adapted. At the same time that the hollow is formed at that part on which the head of the dislocated bone immediately presses, a deposit takes place from the surrounding periosteum, between it and the surface it naturally covers, by which a ridge or lip is produced, forming with the depression a deep cup to receive the head of the bone; also, the tendons or muscles which were lacerated, are united, and the latter accommodate themselves to their altered positions, so that, by a beautiful and gradual change in the injured parts, a new articulation is established.

On account of the great change which thus occurs when a dislocation has remained unreduced for a length of time, it becomes impossible to restore the bone to its original position, and after the expiration of many weeks, such an attempt would not only be absurd, but attended with much risk to the patient.

In an attempt to reduce a dislocation of the humerus, which had existed only six weeks, so much injury was done to the muscles by the violence employed, that the patient died in consequence. Case.

But although dislocations are generally occasioned by violence, and are accompanied by laceration of the ligaments, yet they occasionally arise from relaxation of the ligaments only, the result usually of a morbid accumulation of synovia in the joint. Dislocation from effusion.

I have seen the patella frequently displaced from this cause; and, in the year 1810, I admitted a girl into Guy's Hospital, who was the subject of such dislocation. The patella was suddenly and frequently thrown outwards in walking, which occasioned her to fall, and it required considerable force to reduce it. By the application of some strips of plaister, and a bandage, the bone was readily kept in its proper situation. Of patella.

I once saw a girl who had the power of Case.

throwing the patellæ outwards at will,—she had been brought up as a dancer or tumbler.

From pa-
ralysis.

The loss of power in muscles surrounding a joint, either from paralysis, or from being kept a long time upon the stretch, allow of the joint being easily dislocated ; but, under such circumstances, the reduction is effected without difficulty.

Case.

A young gentleman who had become paralytic on one side during dentition, would readily dislocate the head of the humerus, throwing it over the posterior edge of the glenoid cavity, from whence it could be replaced with facility.

The loss of muscular power, arising from continued extension, is well illustrated by the following case :—

Case.

A junior officer, on board of one of the Company's ships in India, was punished by one of the mates, during the absence of the captain, in the following manner :—His foot was placed upon a small projection on the deck, and his arm was tied and forcibly drawn toward the yard of the ship ; in this position he was kept for one hour. After this, the muscles of the arm gradually wasted, and the bone could be dislocated merely by his raising the extremity to his head, but was easily replaced by slight extension.

These cases prove also, that the muscles in a healthy state must have considerable influence in preventing displacement from violence, as also of resisting the reduction when dislocation has occurred.

Muscles prevent dislocation.

Another more frequent cause of dislocation, is ulceration, by which the attachments of the ligaments are destroyed, when displacement of the joint takes place, either from the action of the muscles, or from there not being sufficient support to counteract the weight of the bone. Thus, in long continued ulcerative disease of the hip joint, we find the head of the femur drawn up on the dorsum of the ilium; and, in the same affection of the knee, I have seen the tibia sink off the condyles of the femur.

From ulceration.

There is in the Museum at St. Thomas's Hospital, a preparation, showing an ankylosis of the tibia, at right angles with the femur, after a dislocation from ulceration.

Case.

It frequently happens that a fracture occurs at the same time with a dislocation; this is more especially the case in the displacements of the ankle joint, which seldom take place without fracture. The acetabulum is sometimes broken in dislocations of the hip, and the coronoid process of the ulna is occasionally separated when that bone is dislocated, which renders it scarcely possible

Dislocation with fracture.

for the surgeon to preserve the parts in their natural position during the treatment.

Case. A preparation in St. Thomas's Museum, shows a fracture of the head of the humerus, occurring with displacement.

Treatment. When dislocation and fracture of a bone occur at the same time, the dislocation should, if possible, be reduced immediately, taking care to prevent further injury to the fractured part, by the application of bandages and splints. For, if the fractured bone be allowed to unite before attempting to replace the dislocation, such union would most probably be destroyed by the additional violence necessary to reduce the bone, after having remained so long out of its natural situation.

So also, if a bone in one limb is dislocated, and in another fractured, the dislocation should be reduced as soon as the fractured bone has been supported and secured from injury.

**Dislocations
not com-
plete.**

Dislocations are not always complete; but in some instances a partial displacement of an articulating surface occurs. A preparation in St. Thomas's Museum, dissected by Mr. Tyrrell, shows an imperfect dislocation of the ankle; the end of the tibia rests still in part upon the astragalus, but the greatest portion is seated on the os naviculare.

**Of the
knee.**

The knee joint, on account of the extensive

articular surfaces, is seldom completely displaced.

The humerus is sometimes thrown upon the anterior edge of the glenoid cavity, but is easily replaced.

Of the humerus.

The elbow joint is liable to partial displacement, both of the ulna and radius.

Of the elbow.

The injuries to the spine, which are sometimes called dislocations, and are producing paralysis of the part of the body below the seat of mischief, are really fractures with displacement of the broken bone. Simple dislocation of the vertebræ, I believe to be an exceedingly rare accident, if we except that which is said to occur sometimes between the first and second cervical vertebræ.

Supposed dislocation of vertebræ.

Violence is usually the cause of dislocations, and is generally applied unexpectedly, when the muscles are not prepared for resistance, and when the bone is in an oblique position with respect to its socket. Under these circumstances, very slight force will produce the displacement which could not otherwise be occasioned, but by great violence.

Causes, violence.

The power of the muscles in resisting excessive force, when prepared for its application, is well illustrated by what occurred in the execution of Damien, for an attempt to murder Louis the XVth. Four young horses were fixed, one to each limb, and were then

Execution of Damien.

compelled to draw in different directions, for the purpose of tearing the limbs from his body ; but this could not be effected, and after fifty minutes trial, the executioners were obliged to cut through the muscles and ligaments, before the limbs could be separated.

Dislocation
rare in old
persons.

Old persons are much less liable to dislocations than those of a middle age, as from the difference in the firmness of their bones, those of the former are much more easily broken than displaced.

In very
young.

In very young persons also, dislocations are rare, as the bones break, or the epiphyses give way under the violence which would otherwise displace them. I have, however, known an instance of dislocation in a child of seven years of age. Displacement often occurs in children from ulceration, as I have already described, and is most frequent at the hip joint. I have seen several cases which have been supposed dislocations of the elbow joint in children, but were really oblique fractures of the condyles of the humerus, in which one or both bones of the fore-arm were drawn backwards with the portion of the condyle.

Compound
dislocation.

In a compound dislocation, besides the displacement of the articulating surfaces, the cavity of the joint is opened by a division of

the exterior soft parts, as the integument, capsular ligament, &c. so that the synovia escapes through the wound.

This injury is usually attended with considerable danger, on account of the inflammation which occurs in the synovial membrane, and lacerated ligaments; the former being of the mucous kind, quickly takes on the suppurative inflammation, and thus a profuse discharge rapidly ensues. The articular cartilages covering the extremities of the bones are gradually destroyed by an ulcerative process, and the bone inflames, granulations are thrown out from the extremities denuded of cartilage, so as to fill up the cavity. Generally these granulations unite, and become ossified, producing ankylosis, but occasionally some degree of motion is gradually regained.

Danger of.

To effect all this, great constitutional powers are necessary, and persons naturally weak are often, under these circumstances, obliged to submit to the removal of the limb to preserve life.

Often require amputation.

Compound dislocation occurs, but very rarely in some joints, as the hip, shoulder, and knee; but is often met with in the ankle, elbow, and wrist.

Rare in some joints.

Much may be done in these cases by judicious treatment in the first instance, when

Judicious treatment.

the object should be to promote adhesions of the external wound, and thus render the dislocation simple. Instead of applying emollients, therefore, to encourage suppuration, which is productive of so much mischief, the edges of the wound should be carefully approximated by strips of plaister, and evaporating lotions should be applied over the limb, which should be left undisturbed for several days.

I shall, however, enter more fully into the treatment of these injuries, when describing the particular dislocations.

Treatment of Simple Dislocations.

Reduction. The first and principal object is the reduction of the dislocated bone, which I have mentioned, becomes difficult in proportion to the time allowed to elapse after the receipt of the injury.

Difficulty
increases
as time
elapses.

If the muscular power be great, great force will be required to overcome the contraction of the muscles, and this difficulty will increase in proportion to the length of time allowed to pass by between the injury and the attempt to reduce the dislocation. In very muscular persons, therefore, no endeavour should be made to reduce a dislocation of the arm, after

a lapse of three months from the receipt of the injury ; but in persons with little muscular power, reduction may be effected before the expiration of four months after the accident. In displacement of the thigh, two months in stout persons, and a few days more in those of relaxed fibre may be allowed as the period after which it would be wrong to employ violent means to endeavour to reduce the dislocation.

The difficulty in reducing dislocations is chiefly owing to the contraction of the muscles, which is involuntary, and which becomes greater in proportion to the length of time which has elapsed after the injury. The muscles have a power of contraction independent of the voluntary or involuntary action, which are common to them, and the former of which cannot be maintained but for a very limited period.

From contraction of muscles.

When the power of a muscle is destroyed, the antagonist muscle immediately contracts, and this contraction is permanent, or as long as the power of the other muscle is wanting. This may be seen in those persons who have suffered from paralysis of the muscles on one side of the face, the opposite side being drawn up and disfigured by the contraction of the opposing muscles. In the same way when a dislocation has taken place, the muscles soon

Effect on muscles.

contract and fix the bone in its new position, and this contraction becomes firmer and more difficult to overcome, the longer the time allowed to elapse before any attempt be made to replace the bone. The reduction should therefore be made as soon as possible after the receipt of the injury.

Other
causes
creating
difficulties.

But independent of the muscular contraction, other circumstances give rise to difficulty in attempting to reduce a dislocation of long standing, and often render the reduction impracticable. The head of the bone becomes adherent to the surrounding parts, so that when the muscles have been divided in dissecting the injured joint, the bone cannot be replaced ; this I have observed in the dislocation of the humerus, and also of the radius. After a time the original cavity becomes filled with new matter, and sometimes a new articular socket is formed for the head of the dislocated bone ; under these circumstances the possibility of the reduction is destroyed.

Form of
joints.

In recent dislocations, the form of the joint may in some instances afford an obstacle to the reduction ; as, when the articular cavity is surrounded by a projecting edge as in the hip, in which case the head of the bone requires to be lifted over the edge when reducing the displacement. If the head of the bone be much larger than its cervix, as in the

radius, it affords an impediment to the reduction.

Some persons have supposed that the return of a dislocated bone to its natural position, might be impeded by the smallness of the aperture in the capsular ligament; but this cannot happen, as the ligament is inelastic, and an aperture admitting the dislocation would as readily admit of the reduction. The capsular ligaments possess, in fact, but little power of preventing dislocations, and the protection is principally afforded by the peculiar ligaments and tendons covering each joint.

Capsular
ligament.

Constitutional, as well as mechanical means, are often necessary to assist in the reduction of dislocations; and in many cases, the employment of force only, is very improper; as, unassisted by constitutional means, much greater violence must be exercised, and consequently the immediate suffering, and subsequent inflammation, will be proportioned to this violence.

Constitu-
tional
means.

Bleeding, the warm bath, and such medicines as create nausea, are the best means of assisting constitutionally in the reduction of dislocation, as they most readily produce a state of faintness, during which the muscular power is greatly diminished. Bleeding is the most powerful, and at the same time the

Bleeding,
&c.

most speedy method of the three, if the blood be drawn from a large orifice, and the patient be kept in the erect position ; it cannot, however, be resorted to in all cases, and might be highly injurious in very old or debilitated persons ; but in the young and robust it may be employed with safety and advantage in the mode I have proposed.

Warm
bath.

In using the warm bath, the temperature should be from 100° to 110°; and the heat should be kept up until the patient feels faint, when he should be taken out, and the mechanical means should be immediately resorted to. The desired effect is much sooner produced by abstraction of blood, during the time that the patient is in the bath, than by bleeding, or the bath singly.

Creating
nausea.

The third mode, viz. that of exciting nausea by the exhibition of tartarised antimony in small doses, is not so certain as the former modes, but it is exceedingly useful in keeping up the state of faintness produced by bleeding or the warm bath, when the dislocation has been of long standing and likely to require a continued application of mechanical means for its reduction.

Opium.

Opium might, perhaps, be serviceable in large doses, as it greatly diminishes muscular power. I have not yet tried it.

Mode of
reduction.

When the power of the muscles has been

lessened, the reduction of the dislocation should be attempted, by fixing one bone, whilst the extremity of the other is drawn towards the socket by extending the limb. Inattention to this point is one of the great causes of failure in attempting to reduce dislocations ; for if the bone in which the socket is situated be not fixed, the reduction cannot be accomplished. If, for instance, in attempting to reduce a dislocation of the humerus the scapula be not fixed, it is necessarily drawn down with the os humeri, and the extension is unavailing. If one person holds the scapula, whilst two extend the humerus, the extension will still be very imperfect: the one bone must be firmly fixed, at the time that the other is extended, to render the force effectual. The extension should be gradually and carefully made, and continued rather to fatigue than extend the muscles by violence. Violence is as likely to lacerate sound parts as to reduce the dislocation, and this I have known to occur.

The force required may be applied by the aid of assistants, or by compound pullies, and in cases of difficulty the latter is much the more preferable mode, as the extension can be thus made gradually and continued ; whereas that made by assistants, is usually irregular, and often ill timed, being more

Use of pul-
lies.

likely to tear the soft parts than to restore the bone to its natural situation.

In all dislocations of the hip, and in those of the shoulder, of long standing, pullies should always be employed, in preference to any other mode of extension, although I do not deny the possibility of reducing these dislocations by the aid of assistants only.

Relaxation
of muscles.

In endeavouring to reduce a dislocation, the position of the limb should be such as to relax as much as possible, the larger muscles, by which the reduction may be greatly facilitated.

Points for
extension.

A difference in opinion exists whether the extension should be made from the dislocated bone, or from the limb below. M. Boyer, who has had great experience in surgery, prefers the latter, but in my own opinion it is best to apply the force to the bone which is dislocated, although in recent dislocations of the humerus, I usually make extension from the wrist, drawing the arm in a line with the side of the body, at the same time placing my heel in the axilla.

Effect of
will.

Much may be done in these cases, at the time the surgeon is attempting the reduction by drawing the patient's attention from the accident, as the muscles are affording much resistance in obedience to the will, as long as the mind is directed to them ; but this

subsides as soon as any other circumstance engages the patient's attention. Thus I have reduced a dislocation of the humerus, by directing a patient to rise, at the time I was making extension by the wrist, having my heel in the axilla, after having made various unsuccessful efforts, whilst he was recumbent. In attempting to rise, the mind was directed to other muscles than those opposing the reduction; and thus the force they had previously exercised, was so far diminished as to allow of the reduction.

Before applying the pullies, a wetted roller should be put round the limb, and the leather to which the rings are fixed to receive the hook of the pullies, should be buckled on over this roller; this will prevent it from slipping during the extension. The cord should at first be drawn very gently, until the resistance of the muscles is felt, when the surgeon should rest for two or three minutes, and then gradually and carefully extend again, and so on until he perceives the muscles quiver; after which a very little more extension will accomplish the desired purpose.

Mode of
applying
the pullies.

The surgeon may know when dislocation is reduced, by the restoration of the natural figure of the articulation.

When re-
duced.

For some time after the reduction of the

After
treatment.

dislocation of the shoulder of long standing, bandages are required to retain the bone in its proper situation; and the same treatment must be adopted after similar accidents to those joints in which the articular cavity is shallow.

In all cases after reduction, rest is necessary, to allow of the union of the ruptured ligaments; evaporating lotions should be employed to prevent excess of inflammatory action, and leeches should be applied if the inflammation run high. Subsequently friction will be found of great service in restoring the natural functions of the joint.

The injuries to the spine, commonly described as dislocations, have been already treated of in a former lecture. I shall now, therefore, proceed with the description of these injuries to the other articulations, and commence with those taking place at the junction of the ribs.

Of Dislocation of the Ribs.

Three
forms.

Three forms of dislocation are mentioned as occurring to the ribs and their cartilages; viz.—First, a displacement of the posterior or vertebral extremity forwards on to the body of the vertebræ. Second, a separation

of the anterior extremity of the rib from its cartilage. Third, a similar injury between the cartilage and the sternum.

The dislocation of the vertebral extremity might occur from a person falling backward on some pointed substance, so as to drive the head of the rib from its natural situation ; such accidents are, however, very rare.

Cause of
first form.

This injury would produce symptoms nearly similar to those from fracture of the rib, as pain on motion, and difficulty of respiration.

Signs of.

The same mode of treatment would be also proper in either case ; as bleeding to prevent inflammation, and the application of a roller to confine the motions of the ribs.

Treatment.

When a cartilage has been separated and displaced either from the rib or from the sternum it may usually be replaced with ease, if the patient will take a deep inspiration, so as to enlarge as much as possible, the diameter of the chest ; for under these circumstances very slight pressure will return the parts to their original position.

Displace-
ment of
cartilage.

After the reduction, a small compress confined over the seat of injury by a bandage, as applied for fractured rib, will be requisite to prevent any future displacement.

Treatment.

In sickly and weak children, an alteration sometimes takes place in the form and direction of the cartilages of the ribs, which might

Deformity
of ribs.

be mistaken for a dislocation. It most frequently occurs at the cartilages of the sixth, seventh, or eighth ribs, and is accompanied with some alteration in the course of the ribs themselves.

Dislocation of the Clavicle.

Articulations
strong.

The articulations of the clavicle with the sternum, and with the scapula, are so firm as to render displacement of either extremely rare, when compared with the dislocation of some other joints.

Dislocations of the Sternal Extremity.

Two kinds. The sternal end of the clavicle may be displaced in two ways;—first, when thrown anterior to the sternum, or forwards;—second, backwards, or behind the sternum.

Anteriorly. In the anterior dislocation, a swelling is readily perceived on the anterior and upper part of the sternum; and if the finger be carried on the surface of the sternum upwards, this projection stops it. On placing the knee between the scapulæ and drawing the shoulders backwards, the swelling disappears; but it reappears when the shoulders

are again allowed to advance. If the shoulder be elevated, the swelling descends, and if the shoulder be depressed, the projection ascends towards the neck.

The patient experiences much difficulty in moving the shoulder, and the attempt creates pain; but when at rest, he suffers but little pain or inconvenience. In very thin persons, the nature of the accident is at first view easily detected, but some difficulty may occur in ascertaining its nature in very fat people.

Pain from motion.

This injury is generally occasioned by a fall, either on the point of the shoulder, which drives the clavicle inwards and forwards, or upon the elbow, at the time that it is separated from the side, which produces the same effect.

Cause.

Sometimes this dislocation is only partial, the anterior part of the capsular ligament alone being lacerated; in this case the projection is but slight, but most frequently all the ligaments are torn through, and the bone with the interarticular cartilage is completely displaced.

Sometimes a partial displacement.

This dislocation is easily reduced by drawing the shoulders backwards, by which the clavicle is drawn off the sternum, when it falls into its natural situation; but the shoulders must be kept in this position to

Treatment.

prevent a recurrence of the displacement, and the arm must be supported, or its weight will affect the position of the bone.

The application of the clavicle bandage and pads in the axillæ will effect the first object, and the second will be gained by placing the arm in a short sling.

Posterior
dislocation
very rare.

I have never seen, or known of an instance, in which the dislocation backwards has been produced by violence ; yet I conceive that it might happen from a blow on the fore part of the bone.

From de-
formity.

The only case of this form of dislocation that I have known, was occasioned by great deformity of the spine, from which the scapula was thrown so much forwards, as not to leave sufficient space for the clavicle between it and the sternum : in consequence of this the clavicle was gradually forced behind the sternum, where it pressed upon the œsophagus, and gave rise to so much inconvenience, as to occasion a necessity for the removal of the extremity ; the trachea from its elasticity escaped pressure, being pushed to one side.

This case was under the care of Mr. Davie, surgeon, at Bungay, in Suffolk, from whom I had many of the particulars. He deserved great praise for suggesting the mode of relief ; and the skill with which he performed the

operation was a proof of the soundness of his professional knowledge.

Miss Loffty, of Metfield, in Suffolk, had Case.
very great distortion of her spine, by which the scapula was gradually thrown so much forwards, as to displace the sternal extremity of the clavicle, forcing it inwards behind the sternum, so as to press upon the œsophagus, and occasion great difficulty in swallowing.

She had become very much emaciated.

Mr. Davie thinking that he could relieve the sufferings of the patient, and prevent the threatened destruction of life, by removing the sternal extremity of the clavicle, performed the following operation:—

He first made an incision of between two and three inches in extent, over the seat of the dislocation, in a line with the direction of the clavicle. After dividing the soft parts surrounding the bone, he placed a portion of stiff sole leather behind it, whilst he carefully sawed through it, about one inch from its end, with Hey's saw; he then elevated it, and separated it from the inter-clavicular ligament.

The wound afterwards healed quickly, and the patient was again able to swallow without difficulty. She lived six years after the performance of the operation.

Dislocation of the Scapular Extremity.

Upwards. I have not ever seen any other dislocation of the scapular extremity of the clavicle, than that in which the end of the clavicle is thrown above the acromion process; and I should conceive it very unlikely for any other form to occur; but I do not mean to deny the possibility of a displacement beneath the acromion process of the scapula.

This extremity is more frequently dislocated than the sternal end, and may be detected by the following signs:—

Signs of. The shoulder of the injured side appears depressed, and drawn nearer to the sternum, than the sound one. This arises from the scapula having lost the support of the clavicle. On examination, the nature of the injury is readily ascertained, by passing the finger along the spine of the scapula, so as to trace the continuation of the acromion with it; in doing this, the finger is stopped by the extremity of the clavicle, which projects above the acromion, and pain is experienced when this elevation is pressed. The swelling disappears when the shoulders are drawn backwards, but rises again if they are allowed to come forward. Pressure

upon the end of the dislocated bone causes pain; but when at rest, the patient suffers but little.

This injury is most frequently occasioned Causes.
by a fall upon the shoulder, by which the scapula is forced inwards towards the chest.*

The reduction of the displaced bone in Treatment.
these cases, may be, in most instances, readily accomplished, by placing the knee between the scapula of the patient, and then drawing his shoulders backwards and upwards. After the reduction, a pad or cushion should be placed in each axilla, for the purpose of elevating the scapulæ, keeping them from the side of the thorax, and to defend the soft parts from the bandage, which should next be applied, as in the former case, only it should be broad, and made to press over the seat of injury. The employment of a short sling is likewise of essential importance.

It rarely happens that these accidents to the clavicle are perfectly recovered from; some degree of deformity usually remains, and of this the patient should be informed at the commencement of the treatment, Not perfectly recovered from.

* I have known this dislocation arise from a blow, by the falling of a heavy piece of timber upon the extremity of the shoulder.—T.

otherwise he may attribute it to the negligence or ignorance of the surgeon; but this deformity will not interfere with the future motions of the joint.

Dislocation of the Os Humeri.

Four directions.

The head of the humerus may be displaced from the glenoid cavity of the scapula, in four directions;—three of the dislocations are complete, and one not perfectly so.

The first is downwards and inwards into the axilla.

The second is forwards, under the pectoral muscle, below the clavicle.

The third is backwards, on the dorsum of the scapula, below the spine.

The fourth is only partial, when the head of the bone rests against the external side of the coracoid process of the scapula.

Of the Dislocation in the Axilla.

Signs of.

This dislocation may be known by the following signs: — The rotundity of the shoulder is destroyed, and a hollow may be felt below the acromion process of the scapula, in consequence of the head of the

humerus being displaced from the glenoid cavity, by which the deltoid muscles loses its support, and is dragged down with the depressed bone. The arm is lengthened, as the superior extremity of the humerus is placed beneath its natural articular surface. The elbow is separated from the side, and cannot be made to touch it, but with difficulty, as the effort presses the head of the bone upon the axillary nerves, occasioning severe pain, and the patient generally supports the arm with the hand of the sound limb, to prevent the weight from pressing on these nerves. If the elbow be far removed from the side, the head of the os humeri can be easily felt in the axilla, but not so if the arm be allowed to remain nearly close to the side; raising of the limb throws the head of the bone downwards, and to the lower part of the axilla, so that it can be more readily felt.

The motions of the joint are in a great degree destroyed, especially upwards and outwards, and the patient cannot raise his arm by muscular effort; for this reason, it is usual, when wishing to detect a dislocation, to ask the patient if he can raise his hand to his head. The answer invariably is, that he cannot, if a dislocation exists. The arm cannot be rotated, but a slight

degree of motion backwards and forwards still remains.

Motion
sometimes
consider-
able.

In very old persons, and in those having a relaxed state of muscles, the degree of motion is occasionally but little inferior to that which exists when the bone is in its natural state.

Crepitus.

Some time after the accident, a crepitus may be often felt, occasioned by inflammatory effusion, and from the escape of synovia; but it is never so distinct as that produced from fracture.

There is frequently a numbness of the fingers, from the pressure of the head of the bone upon the axillary nerves.

Signs in-
distinct.

Thus it will be found, that the principal marks of the accident are, the loss of the rotundity of the shoulder, the presence of the head of the bone in the axilla, and the destruction of the natural motions of the joint. But often these marks are but little apparent in a few hours after the receipt of the injury, from the extent of swelling which occurs, on account of extravasation; they, however, became again distinct when the tumefaction and inflammation have subsided. Under these latter circumstances it is, that the London Surgeons are generally consulted, when the nature of the injury can ^{not} be mistaken; whereas, the general

practitioner is called upon during the state of tumefaction and inflammation, to form his opinion, and should he then overlook a dislocation, it is our duty, in justice to the general practitioner, to inform the patient that the difficulty of ascertaining the true nature of the accident is very greatly diminished by the cessation of swelling and inflammation.

The readiness with which the injury may be detected, will also differ much in very thin and emaciated persons, or in those loaded with fat, and possessing large and powerful muscles.

The most common causes of this accident, Causes. are falls upon the hand, when the arm is above the horizontal line, or upon the elbow, when the arm is raised from the side; but more especially by a fall upon the shoulder itself, when the muscles are unprepared to resist the violence.

When the arm has been once displaced, Liability to recur. it is much more liable, after the reduction, to be again dislocated, unless great attention be paid to the injured joint; and very slight causes will often produce a recurrence of the injury, which I have known take place merely from the action of lifting up the sash of a window.

When an apprentice at St. Thomas's Hos- Case.

pital, as I was one morning going through the wards, I was called to visit a man who had dislocated his shoulder in the ordinary effort of stretching himself, and rubbing his eyes, when he first awoke.

Proper
mode of
preventing.

To prevent as much as possible this disposition to future dislocation, the limb should be kept perfectly at rest for three weeks after the reduction, during which time, a pad should be fixed on the axilla, and the arm bound to the side, thus the lacerated parts will have time and opportunity to unite, which they cannot well do if the usual motions are permitted.

Dissection.

I have had opportunities of dissecting two recent cases of the dislocation downwards, in which I found the following appearances :—

Case.

In the first case, the axillary vessels and nerves were forced backwards upon the subscapularis muscle, by the head of the dislocated humerus. The deltoid muscle was drawn down, and the supra and infra spinati muscles were stretched over the glenoid cavity, and inferior edge of the scapula. The head of the bone was seated between the coraco brachialis and axillary plexus. The capsular ligament was extensively lacerated on the inner side of the glenoid cavity, as was also the tendon of the

subscapularis muscle, where it covers the ligament.

In the second case, violent attempts had been made to reduce the dislocation five weeks after its occurrence, but without success, and the patient died from the effects of the violence used in the extension. The pectoralis major was slightly lacerated, the supra spinatus very much so; the infra spinatus and teres minor were also torn, but not to any great extent; the deltoid and coraco brachialis had also suffered a little. The capsular ligament had given way between the teres minor and subscapularis tendons, the latter being separated from the lesser tubercle of the humerus.

In these dissections, I found that the supra spinatus and deltoid muscles were those which afforded the chief resistance to the reduction of this dislocation; therefore, in order to effect the reduction, the best direction in which the arm can be extended, is at a right angle with the body. The biceps should be at the same time relaxed by bending the elbow.

Case.
Muscles
affording
resistance.

In examining a dislocation which has existed for several years unreduced, the head of the bone is found much altered in form, being flattened on that side next the scapula, but it is perfectly covered by a

capsular ligament. The glenoid cavity is completely filled by a substance of a ligamentous nature, with some small portions of ossious matter suspended in it, and a new articular surface is formed for the head of the dislocated bone, on the inferior costa of the scapula.

Of the Reduction of the Dislocation in the Axilla.

Modes of
reduction
differ.

The means employed for the reduction of the head of the humerus when dislocated downwards into the axilla, must differ according to the circumstances attending the accident; but in all recent cases, I generally attempt the reduction by the heel in the axilla, which may be done in the following manner:—

By the
heel in the
axilla.

The patient should be placed on a sofa, or table, near the edge, in a recumbent posture, and a wetted roller should be bound round the arm, just above the elbow, over which a handkerchief or towel should be fastened; the elbow being then separated from the side, the surgeon places the heel of one foot in the axilla, and rests the other upon the ground, as he sits by the patient's side. The heel should be placed far enough

back to receive the inferior edge of the scapula, and prevent its descent at the time that the arm is extended. The extension is to be made from the handkerchief or towel, and continued steadily for four or five minutes, in which time usually the head of the bone slips into its proper cavity. The force of two or more persons may be employed in extending, by means of the towel, if required.

If, however, the accident is of several days standing, and if the muscles have been fixed and rigid, more force than can be applied as above will be required to effect the reduction, and the following means must be resorted to :—

If of some standing.

The patient must be placed in a chair, and the scapula fixed by a bandage with a slit in it, which admits the arm through it; this must be tied over the acromion, so as to keep it well in the axilla. Next, place a wetted roller round the arm immediately above the elbow, to protect the skin, and upon it fix a very strong worsted tape, by what is termed the clove-hitch. Then raise the arm at right angles with the body, or a little above the horizontal line, to relax the deltoid and supra spinatus muscles. Two persons then holding the scapula bandage, should keep it fixed, whilst two others draw from the bandage affixed to the arm with a steady, equal, and

Second mode,

combined force. After the extension has been kept up for a few minutes, the surgeon should place his knee in the axilla, resting his foot on the patient's chair; he should then raise his knee by extending his foot, and at the same time, with his right hand, push the acromion downwards and inwards, by which the reduction will be generally accomplished.

Whilst the extension is kept up, a gentle rotatory motion will diminish the counteracting power of the muscles, and materially expedite the reduction; but should the force applied in this way not be sufficiently steady and continued, then we must apply the pulleys, not with a view of exerting greater force, but to enable the surgeon to employ it more equally and gradually.

Use of pul-
lies.

The bandages, &c. being applied, as in the last instance, the patient is to be seated between two staples, which are to be fixed in the walls of the apartment, so that the force can be employed in the same direction as before-mentioned. The surgeon should first draw gently and steadily until the patient complains of pain, when he should stop, but not relax the extension. Much advantage may be gained now by conversing with the patient, and directing his attention to indifferent subjects. In two or three minutes he

may carefully extend a little more, and then cease again, and so on, until he has made as much extension as he thinks correct, but he should at intervals slightly rotate the limb. Then giving the string of the pulley to an assistant, desiring him not to relax, he should place the knee in the axilla, and press the acromion as before described, when the bone glides into its proper situation, not however with a snap, as when the other means are employed.

In the hospital practice, I usually order the patient to be bled, and put into a warm bath at the temperature of 100° to 110° , giving him a solution of tartar emetic until he becomes nauseated and faint, when he is immediately taken from the bath, and extension applied before he regains muscular power. This plan obviates the necessity of using any great force. Hospital treatment.

In very old relaxed persons, or in very delicate females, another mode of reducing this dislocation may be resorted to, by placing the knee in the axilla in the following manner:—The patient should be seated upon a low chair, when the surgeon should separate the injured arm from the side, and then resting his foot upon the chair, should place his knee in the axilla, and holding the arm with one hand over the condyles of the By the knee in the axilla.

humerus, and pressing the acromion of the scapula with the other, he should then depress the elbow, by which the dislocation will be reduced.

When often dislocated, easily reduced. Case.

After frequent displacements of the shoulder, but very slight force is necessary to reduce any future dislocations. A gentleman in the country, of my acquaintance, who has frequently dislocated his shoulder, has often reduced it himself in the following way,—by leaning over one of the common field gates, and laying hold of one of the lower bars, then allowing his body to weigh down on the other side ;—this is on the same principle as placing the heel in the axilla, which will effect the reduction of three-fourths of the recent dislocations.

Of Dislocation forwards under the Pectoral Muscle.

Easily detected.

This dislocation is much more readily detected than the former. The depression beneath the acromion process of the scapula is greater, and the process itself appears more prominent. The head of the os humeri can be distinctly felt, and, in thin persons, may be seen forming a swelling beneath the clavicle, which moves when the elbow is rotated.

The head of the bone is situated internal Signs of.
to the coracoid process, between it and the sternum, and is covered by the large pectoral muscle. The arm is shortened, and the elbow is separated from the side, being forced outwards and backwards; the motions of the arm are more affected than in the former dislocation, the head of the bone being fixed, by the coracoid process and neck of the scapula on the outer side, by the clavicle above, and by the muscle on the fore part, as well as by the action of the teres minor with the supra and infra spinati muscles, which are rendered very tense.

The pain occasioned by this injury is not so severe as in the dislocation into the axilla, because the axillary vessels and nerves are less compressed.

The chief diagnostic marks, are the position of the limb, the elbow being carried from the side and backwards; the head of the bone being readily felt below the clavicle, and its moving when the arm is rotated. Chief marks.

There is in the Museum at St. Thomas's Hospital, a beautiful preparation, showing a dislocation of this kind of long standing, which presents the following appearances:—
The head of the humerus rests upon the neck and part of the venter of the scapula, Dissection of.

just below the supra-scapular notch; the subscapularis muscle has in part been raised so that the head of the bone rests on the scapula; the subscapularis and serratus magnus muscles being between the extremity of the humerus and the surface of the ribs. The tendons of all the muscles attached to the tubercles, as also that of the long head of the biceps muscle remain perfect. The glenoid cavity is filled with a ligamentous substance, but its general figure is not much altered; and to this ligamentous structure the tendons of the supra and infra spinati, and of the teres minor muscles are adherent, having however a sesamoid bone formed in them: a new socket has been formed, which extends from the glenoid cavity, to the venter of the scapula, occupying about one-third of its width, it has a complete lip, and is irregularly covered with cartilage; the head of the humerus is a good deal altered in form, and its cartilage has been in many places removed by absorption: a perfect capsular ligament has been formed.

Causes. Violent blows upon the shoulder, or falls upon the elbow, when it is thrown behind the line of the body, are the usual causes of this dislocation.

Of the Reduction of the Dislocation forwards.

In recent dislocations of the kind, the reduction may be accomplished by placing the heel in the axilla, and making extension from the arm as before described; the foot should, however, be placed rather more forwards, to press on the head of the bone, and the arm should be drawn a little backwards as well as downwards.

When recent.

When the dislocation has existed for some days, it will be best to use the pullies, as continued and steady extension will be required to reduce it.

When of long standing.

The scapula must be fixed by the same bandage as formerly described, and the wetted roller, with a strap for the pullies, fixed on in the same manner above the elbow. The fore-arm should be bent to relax the biceps muscle.

Mode of reduction.

The most important circumstance, is the direction in which the extension is to be made, which must be outwards, a little downwards and backwards; for if it be made horizontally, as in the former case, the coracoid process of the scapula prevents the head of the humerus from passing outwards in its proper situation.

Direction of extension.

When the head of the bone has been

brought below the coracoid process, by the extension, the surgeon should, with his knee, press it backwards and upwards to the glenoid cavity, at the same time pulling the arm forwards from the elbow, by which means he will expedite the reduction. As the resistance is greater, the extension must generally be continued longer than that required to reduce the dislocation into the axilla.

Of the Dislocation backwards on the Dorsum of the Scapula.

Situation
of bone.

In this dislocation, the head of the humerus is thrown upon the dorsum of the scapula, below the spine, where it forms a projection at once perceptible to the eyes of the surgeon, and this enlargement may be seen and felt to move when the elbow is rotated. The motions of the arm are less confined than in either of the former dislocations.

Very rare.

Only two cases of this kind has occurred in Guy's Hospital during thirty-eight years. One was during my apprenticeship, and was under the care of Mr. Forster. The nature of the injury was scarcely to be mistaken, on account of the projection formed by the head of the bone upon the posterior part of the

scapula. The bandages were applied, and the extension made in the same way as for the dislocation into the axilla, and the reduction was quickly accomplished.

The second case was reduced in the same manner by the dresser, it occurred some years after the former.

Of Partial Dislocation of the Os Humeri.

This is an accident of frequent occurrence. Of common occurrence.
The head of the humerus is displaced forwards, and rests against the coracoid process of the scapula; there is a depression under the back part of the acromion, the axis of the arm is directed inwards and forwards, and the under motions of the arm can still be made, but it cannot be elevated as the head of the bone strikes against the coracoid process, over which it forms an evident projection, moving when the arm is rotated.

Mr. Brown, aged fifty, was thrown from Case,
his chaise and injured his shoulder, which upon examination was found to have lost its roundness, and a depression was perceptible under the acromion process; the arm could be moved readily, except directly upwards.

The only opportunity which I have had of seeing the dissection of this accident, was

through the kindness of Mr. Paty, surgeon, Bouverie Street, he had the subject brought to him for dissection at St. Thomas's Hospital.

The following is Mr. Paty's account:—

Mr. Paty's
dissection
of.

Partial dislocation of the head of the os humeri, found in a subject brought for dissection to St. Thomas's Hospital, during the latter part of the year 1819.

The appearances were as follows:—The head of the os humeri, on the left side, was placed more forwards than is natural, and the arm could be drawn no further from the side, than the half-way to the horizontal position.

Dissection. The tendons of those muscles which are connected with the joint were not torn, and the capsular ligament was found attached to the coracoid process of the scapula. When this ligament was opened, it was found that the head of the os humeri was situated under the coracoid process, which formed the upper part of the new glenoid cavity; the head of the bone appeared to be thrown upon the anterior part of the neck of the scapula, which was hollowed, and formed the lower portion of the new glenoid cavity. The natural rounded form of the head of the bone was much altered, it having become irregularly oviform, with its long

axis from above downwards; a small portion of the original glenoid cavity remained, but this was rendered irregular on its surface, by the deposition of cartilage; there were also many particles of cartilaginous matter upon the head of the os humeri, and upon the hollow of the new cavity in the cervix scapulæ, which received the head of the bone. At the upper and back part of the joint, there was a large piece of the cartilage, which hung loosely into the cavity, being connected with the synovial membrane at the upper part only by two or three small membranous bands. The long head of the biceps muscle seemed to have been ruptured near to its origin, at the upper part of the glenoid cavity; for at this part the tendon was very small, and had the appearance of being a new formation.

The same causes which produce the dislocation under the clavicle, only with less violence, will occasion this displacement. Causes of.

The reduction in these cases may be accomplished by the same means as those directed to be employed for the dislocation forwards; but in addition, it is necessary to draw the shoulders backwards, and after the reduction, a bandage must be applied to keep the head of the bone in its proper situation, and to prevent the motions of the scapulæ. Reduction of.

forwards, or otherwise the bone will again slip out of the glenoid cavity.

Of Compound Dislocation of the Os Humeri.

Forwards. In the dislocation of the os humeri forwards, the head of the bone may, by excessive violence, be forced through the exterior soft parts.

Treatment of. In such a case, the reduction of the displaced bone should be immediately effected by the means I have already recommended for the simple dislocation; and when replaced, the edges of the external wound should be approximated by a suture, and then lint dipped in blood should be applied over the wound, which is to be further supported by strips of adhesive plaister. The limb must be fixed to the side, by a roller passed round it and the body, this will prevent any motion of the limb, and thus there will be less risk of the suppurative inflammation occurring, which would greatly endanger the patient's life.

Mr. Dixon's case. Mr. Dixon, of Newington, kindly furnished me with the following particulars of a case which was under his care:—

Robert Price, aged fifty-five, fell, when in a state of intoxication, upon his shoulder,

which produced a dislocation of the humerus, and forced the head of the bone forwards, through the integuments of the axilla; and I found it situated on the anterior part of the thorax, over the large pectoral muscle. The reduction was accomplished with great ease, after which he was placed in bed, and an evaporating lotion was applied. The following morning he complained of great pain, and considerable swelling had taken place, for this he was bled and purged freely, the injured part was poulticed, and anodynes were given to relieve pain and procure rest. For several days afterwards, leeches were repeatedly and freely applied over the joint, until after about two weeks from the receipt of the injury, when the wound began to discharge very freely a healthy pus. This continued for ten or twelve weeks, during which time his constitution suffered much, he was restless, irritable, and became emaciated. Afterwards, a number of small abscesses formed in the surrounding cellular tissue, occasioning sinuses, some of which were exceedingly troublesome, requiring dilitation. This was kept up for twelve months, when all discharge ceased, but the joint was completely ankylosed. He retained, however, perfect use of the fore arm and hand.

Of Injuries near the Shoulder Joint liable to be mistaken for Dislocations.

Fracture of the Acromion.

Signs of.

When this process of bone is broken off, it is drawn down by the weight of the arm, the deltoid muscle having in part lost its support, allows the head of the os humeri to sink as far as the capsular ligament will admit of its doing so, and the roundness of the shoulder is consequently destroyed. On tracing the finger along the spine of the scapula, towards the acromion, a depression is felt at the point of natural junction between these two parts. If the arm be raised from the elbow, so as to carry the head of the humerus upwards, the shape of the shoulder is immediately restored, as the acromion process is returned to its original position, but as soon as the arm is allowed again to hang down, the deformity recurs; when the arm has been elevated, a crepitus may be distinctly felt, by pressing one hand over the seat of injury, and at the same time rotating the elbow.

Treatment
of.

In the treatment of this accident, the os humeri is to be made the splint, to keep the fractured bone in its proper position; and to

effect this, the elbow is to be raised, and the arm fixed, but a thick pad or cushion must be placed between the elbow and side, to separate the former from the latter, and thus relax the deltoid muscle, otherwise the broken extremities of the bone will not be in contact. The pad having been placed between the side and elbow, the arm should be bound firmly to the chest by a roller, and a second bandage, or a short sling should be applied to support the elbow, and this position should be maintained for three weeks.

Very little inflammation usually follows this injury, and the disposition to ossific union is very feeble; thus, unless the fractured ends of the bone be placed in close contact, and if they be not kept perfectly at rest during the time required for such union, the junction will be by a ligamentous structure, instead of by bone. Union by ligament,

Fracture of the Neck of the Scapula.

This accident is much more likely to be confounded with dislocation than any other of the injuries to the shoulder joint. The fracture takes place through the narrow part of the neck of the scapula, opposite the notch Like dislocation.

of the superior costa; and the glenoid cavity falls with the head of the humerus into the axilla. The rotundity of the shoulder is therefore destroyed, a hollow exists below the acromion process; and the head of the os humeri can be felt in the axilla, as when the dislocation into the axilla occurs.

Signs of.

In these cases the deformity of the shoulder is easily removed by raising the arm; but when the support is withdrawn, the appearances of dislocation again present themselves; and by grasping the shoulder so that the fingers rest upon the coracoid process, a distinct crepitus may be felt when the arm is rotated. Thus the ease with which the form of the shoulder is restored, the re-appearance of dislocation when the support is withdrawn; and the perception of crepitus in the situation of the coracoid process, are the principal diagnostic marks of the fracture of the neck of the scapula.*

* The above account is that which I have given for many years in my lectures, and which I thought fully to explain the nature of the symptoms attending this accident, although it had never been confirmed by any subsequent dissection of the parts.

Two cases have lately offered themselves, in which I have had opportunities of carefully examining the shoulder joint, after the receipt of injuries, which, at the time, produced the above described symptoms, and which had been considered as fractures of the cervix scapulæ.

*Fig. 2 Fall, no Autopsie gemacht worden, fand aber
Loose. Lach's Anatom. Atlas & Humerus mit*

In the treatment of this injury, two principal points must be attended to. First, to elevate Treatment.

The first case was that of a Mr. B. a West India Merchant, who, at my request, bequeathed to me the joint in which this accident was supposed to have occurred; his executors resisted my claim, but after some little difficulty I obtained my legacy. On exposing the cavity of the axilla, I there found the head of the os humeri separated from the shaft of the bone; it was seated just below the cervix of the scapula, and was united by a ligamentous matter to the venter of the scapula, close to the anterior costa. The fracture had taken place between the articular surface of the humerus, and its tubercles; the capsular ligament had been lacerated, so as to permit the separated portion to escape into the axilla; and the upper part of the shaft of the bone with the tubercles, had fallen in upon the glenoid cavity, by which the roundness of the shoulder had been destroyed; the glenoid cavity was but little altered, and the patient had before his death, acquired a free motion of the joint in every direction, excepting as a sword arm, for he could not raise his elbow above the horizontal line. The parts are preserved in the museum at St. Thomas's Hospital.

In the second, that of a gentleman in Gainsford Street, a patient of Mr. Greenwood's, in whom a fracture of the cervix scapulæ was supposed to have occurred, and who died in consequence of retention of urine, I discovered, on inspecting the injured joint, nearly the same appearances as in the former dissection.

Having thus ascertained the true nature of this injury, by the only accurate mode, viz. that of dissection, I have since been able readily to trace it in the living subject.

Mr. B. the medical attendant of Lord Y. whilst

the head of the humerus ; and, Secondly, to carry it outwards ; the latter object will be effected by putting a thick compress on the axilla ; and the former, by elevating the arm and confining it in a short sling.

*Of Fracture below the Tubercles of the
Humerus.*

Rare in
middle
aged per-
sons.

This injury sometimes occurs in the young and old, but rarely in the middle aged. In the young the separation takes place between the epiphysis and shaft of the bone, and in the old, near the same spot, from the weakness of the bone at that part. In these cases

travelling with his lordship in the Isle of Wight, had his shoulder injured in consequence of the carriage being overturned. Sometime after I saw him in London, in consultation with several medical gentlemen, and on examining the shoulder I found a depression beneath the acromion process ; and could distinctly feel the head of the humerus in the axilla. The rotundity of the shoulder could be easily restored by elevating the arm so as to carry the upper portion of the bone upwards and outwards ; but whilst the humerus was supported in this position, I could still plainly feel the head of the humerus in the axilla, separated from the shaft of the bone.

I must confess, that I now doubt the very frequent occurrence of the fracture of the cervix scapulæ.

the head of the humerus remains in the glenoid cavity, but the body of the bone sinks into the axilla, drawing down the deltoid muscle so as to lessen the roundness of the shoulder.

I made the following notes respecting the Case.
 case of a child about ten years of age, brought into Guy's Hospital with this injury. The limb could not be moved without creating great pain: if the upper part of the bone was fixed, the lower portion could be tilted out so as to be felt, and to form a visible projection, and in doing this a crepitus was distinctly perceived, which could not be felt whilst the bone remained depressed into the axilla. The head of the humerus did not obey the rotatory motions of the elbow.

In treating this accident, a roller should Treatment.
 be applied from the elbow to the shoulder; and then a splint must be placed on the inner, and another on the outer side of the arm, with proper pads, and these must be fixed on with tapes, or a roller. A cushion should be put in the axilla, to throw out the upper part of the bone, and the limb should be gently supported in a sling, but not at all forced up, or the bones will overlap.

LECTURE XLII.

Dislocations of the Elbow Joint.

THE elbow may be dislocated in five different ways.

- 1st. The ulna and radius backwards.
- 2nd. The ulna and radius laterally.
- 3rd. The ulna separately from the radius.
- 4th. The radius alone forwards.
- 5th. The radius alone backwards.

Of Dislocation of the Ulna and Radius backwards.

Signs of.

This injury is strongly marked by the great change in the figure of the joint, and by the destruction of its principal motions. The ulna and radius form a considerable projection above the natural position of the olecranon posteriorly, with a depression on each side; on the fore part, the extremity of the humerus occasions a swelling, behind the tendon of the biceps muscle. The flexion

of the joint is almost destroyed, and the fore arm and hand are fixed in a supine position.

In the museum at St. Thomas's Hospital is a preparation showing the effects of a compound dislocation of this kind, which I had an opportunity of dissecting.

The olceranon projected one inch and a half above its usual position, posteriorly, and the coronoid process of the ulna rested in the posterior fossa of the humerus; the radius was thrown upon the back part of the external condyle of the humerus; the condyles themselves formed a large swelling anteriorly. The capsular ligament was lacerated extensively on its forepart, but the coronary ligament remained entire. The brachialis anticus muscle was greatly stretched, and the biceps moderately so, by the altered position of the radius and ulna.

Dissection
of.

The mode in which this accident is produced is by a severe fall, when the person puts out the hand to save himself; but the whole weight of the body being received upon the limb before it is perfectly extended, the radius and ulna are forced backwards and upwards behind the humerus.

Cause.

The reduction of this dislocation may be readily accomplished by the following means. The patient being seated on a chair, the surgeon should lay hold of his wrist and place

Mode of
reduction.

his knee on the inner side of the elbow joint, then pressing down the ulna and radius with his knee, so as to separate them from the humerus; he should at the same time bend the arm gradually and firmly; the coronoid process is thus removed from the posterior fossa of the humerus, and the action of the muscles draws the bones into their proper situations. Bending the arm around a bed post, or over the back of a chair, will also effect the reduction.

After
treatment.

After the reduction the arm should be bandaged in the bent position, at rather less than a right angle with the upper arm; the bandage should be kept wet with an evaporating lotion, and the limb supported by a sling.

Of Dislocation of the Ulna and Radius laterally.

External
or internal.

This dislocation may take place either externally or internally; in one case the ulna is thrown upon the external condyle of the humerus, and in the other instance, upon the internal condyle.

Signs of
external.

In the external displacement, the olecranon forms a greater projection than in the dislocation backwards, as its coronoid process is seated upon the external condyle of the

humerus, instead of being placed in its posterior fossa ; the head of the radius is thrown to the outer side, and behind, where it forms a swelling, which moves when the hand is rotated.

When dislocated internally, the olecranon Of internal. projects equally as in the former case, but the head of the radius falls into the posterior fossa of the humerus ; the external condyle forms a large protuberance on the outer side.

This accident is produced in the same way Cause. as the former, only that the direction of the limb at the time varies.

The reduction in these cases may be Reduction. effected by the method described as proper for the dislocation backwards ; it is not necessary to move the fore-arm outwards or inwards, as the actions of the biceps and brachialis anticus muscles draw the bones into their natural positions, immediately that they are separated from the extremity of the humerus.

In a recent case of this dislocation in a Case. lady, I speedily reduced it by forcibly extending the arm ; when the tendons of the biceps and the brachialis anticus muscles acted as strings from a pulley, and forced the condyles of the humerus backwards.

Of Dislocation of the Ulna backwards.

Signs of.

When the ulna is thrown backwards upon the os humeri, and the radius remains in its natural situation, the olecranon forms a projection behind, and the fore-arm and hand are twisted inwards. The fore-arm cannot be brought to more than a right angle with the upper-arm, without considerable force.

It is not so readily detected as the former injuries ; but its chief diagnostic marks are the projection of the ulna, and the turning of the fore-arm inwards.

Dissection
of.

A preparation in the museum at St. Thomas's hospital affords an excellent opportunity of viewing the nature of this dislocation. The displacement had existed for a long time unreduced. The coronoid process of the ulna rests in the posterior fossa of the humerus ; the olecranon projects behind ; the head of the radius has made a considerable depression in the external condyle. The coronary, oblique, and a small portion of the interosseous ligaments have been torn through.

Cause.

This dislocation is produced by the application of violence in the direction of the lower extremity of the ulna, which forces it suddenly upwards and backwards.

The reduction is in this case much more readily made than when both bones are displaced, and by the same means. The radius assists the return of the ulna to its proper position, by pushing the condyles back, when the fore-arm is bent, and the brachialis anticus acts at the same time in drawing the ulna forwards.

Reduction
of.

Of Dislocation of the Radius forwards.

The radius is sometimes separated from its attachment to the coronoid process of the ulna, and is displaced into the depression above the anterior part of the external condyle of the humerus, and also above the coronoid process.

Situation
of bone.

I have seen several cases of this injury, which exhibits the following marks. The fore-arm is a little bent, but cannot be either completely flexed or extended. When an attempt is made to bend the fore-arm, the motion is suddenly stopped by the striking of the radius against the humerus, and the surgeon is immediately convinced that this check to the flexion is by the striking of one bone upon another. The hand is nearly in a state of complete pronation, but cannot be rendered entirely so, nor can it be placed

Signs of.

in a supine position. The head of the radius may be felt on the fore and upper part of the elbow joint, and its movements are perceptible when the hand is rotated.

The sudden stop to the flexion of the forearm, and the situation of the head of the radius are the most distinguishing marks of this injury.*

Dissection
of.

On dissecting this injury, the head of the radius is found resting in the depression above the external condyle of the humerus. The coronary, the oblique, with part of the interosseous, and the anterior portion of the capsular ligaments are lacerated. The biceps muscle is shortened.

Cause.

The dislocation is occasioned by a fall upon

* A sailor about thirty years of age, applied at St. Thomas's Hospital with a dislocation of the radius forwards, which had existed above six months. I could readily feel the head of the radius above the external condyle, particularly when I bent the arm as much as possible, and flexed the hand towards the forearm. The hand was half supine, and could not be placed entirely in the supine or prone positions, if the humerus was fixed. A sudden stop was experienced when bending the arm, by the head of the radius striking upon the humerus. The man had regained a great degree of motion, yet was extremely anxious for me to attempt the reduction, which I declined, and urged him not to allow any one to make the trial, as I was confident it would have been useless.—T.

the hand when the limb is fully extended, the weight of the body being received upon the inferior extremity of the radius.

The first case I had an opportunity of seeing of this accident, occurred under the care of Mr. Cline, during my apprenticeship to him, at St. Thomas's Hospital. The most varied attempts, which his strong judgment could suggest, were made to reduce the displacement, but without success; and the woman was discharged with the bone still displaced. Case.

The second case which I witnessed was in a lad, whom I was asked to visit by Mr. Balmanno, in Bishopsgate Street; but I could not succeed in reducing the dislocation although I persevered, with varied modes of extension, for more than an hour and a quarter. Case.

In the third case, I succeeded in replacing the bone during the time that the patient was in a state of syncope; by resting his olecranon upon my foot, (as he lay upon the floor,) to prevent the ulna from receding, and then extending the fore-arm. Case.

Another case which I attended with Mr. Gordon, was reduced by placing the arm over the back of a sofa, thus fixing the humerus, whilst we made extension from the hand so as to act alone on the radius. Case.

Best mode
of extension.

One evening after I had lectured upon this subject, and had explained the difficulties of reduction, Mr. Williams, one of my pupils, told me that he had known this dislocation reduced by extending the hand only. This I soon convinced myself was correct, by experiments on the dead body. The connection of the hand with the radius, allows of the application of force to extend this bone without including the ulna. In making the extension the humerus should be fixed, and the hand rendered as much as possible supine, to remove the head of the radius from the upper part of the coronoid process of the ulna.

Of Dislocation of the Radius backwards.

Very rare.

The only instance in which I have seen this dislocation, was in a subject brought to St. Thomas's dissecting room, in the year 1821; the displacement had existed some time.

Signs of.

The head of the radius was thrown behind, and to the outside of the external condyle of the humerus, where it formed a projection which could be readily seen as well as felt, when the arm was extended. The oblique, and coronary ligaments were torn through, and the capsular ligament was partially lacerated.

Of the cause of this accident I am ignorant, as I have never seen the accident in the living subject.

The reduction, I should imagine, would be easily effected by bending the arm, after which it would be proper to support the bone in its proper position, by means of bandages, and keep the arm bent at right angles, for three or four weeks, until the ligaments have had time to unite. Reduction.

Accidents at the Elbow Joint likely to be confounded with Dislocations.

Fracture above the Condyles of the Humerus.

When the condyles of the os humeri are obliquely fractured a little above the elbow joint, the appearances presented are so like to those occurring from the dislocation of the ulna and radius backwards, that the two injuries might be readily confounded; in the fracture, however, all marks of dislocation are easily removed by extension, but return again as soon as the extension is withheld, and by rotating the fore-arm upon the humerus, a distinct crepitus can be usually felt. Like the dislocation backwards.

In July, 1822, a boy about nine years of age was admitted into Guy's Hospital, having Case.

fallen from a cart upon his elbow. The arm was a little bent, and the ulna and radius appeared to form a large projecting behind the elbow joint: when the fore-arm was extended, the appearances of dislocation subsided, but they returned immediately that the extension was discontinued. The arm was secured in splints, which were removed in ten days, when passive motion was carefully employed; the lad recovered.

Frequent
in children.

This injury is much more frequently met with in children than adults; but I have known it to occur at nearly all ages.

Treatment.

In treating this accident, the arm should be bent, and the fore-arm drawn forwards to replace the fractured portions, and should be then secured by a bandage.

A splint having two portions joined at right angles, is best adapted to this case; the upper portion is to be placed behind the upper arm, and the lower part under the fore-arm; a splint will be also required on the fore part of the upper arm; these should be well secured by straps, the arm should be supported by a sling, and evaporating lotions kept applied.

Passive
motion.

After the lapse of a fortnight in the young patient, and of three weeks with the adult, passive motion should be carefully employed to prevent ankylosis, which may otherwise

take place. In some of these cases, the loss of motion in the joint is considerable, even after the greatest care and attention on the part of the surgeon.

Of Fracture of the Internal Condyle of the Humerus.

When this accident occurs the ulna projects backwards, from having lost its support. The injury may be distinguished from others by the crepitus, which can be felt upon bending and straightening the arm, and from the hand being turned towards the side during the extension. Signs of.

The same mode of treatment as that directed for the fracture above the condyles, will be proper in this case; passive motion must be employed early, when the recovery will be complete. Treatment.

Of Fracture of the External Condyle of the Humerus.

This injury produces swelling over the external condyle, and pain is experienced at the part on pressure, or during the flexion and extension of the arm; but it is best Signs of.

distinguished by the crepitus, which can be readily felt during the rotatory motions of the hand. If the portion of bone detached be large, it is displaced backwards, and the head of the radius accompanies it.

Dissection
of.

Two preparations in the museum at St. Thomas's Hospital, exhibit specimens of this fracture; one is oblique, and the other transverse at the extremity of the condyle. There is not any ossific union in either, but the fractured portions are joined by a ligamentous substance, and this appears to be the case in all instances of fracture with a capsular ligament.

Frequent
in children.

Children are generally the subjects of this accident; it is seldom met with in adults, and very rarely in advanced age; and it is occasioned usually by a fall upon the elbow.

Treatment.

The best mode of treatment in this injury, is to place a roller around the joint, which should pass also above and below it, then to support the limb in the splint, having two portions at right angles, as in fracture above the condyles; and to this, the upper and lower arm are to be well secured. In young children, a portion of stiff paste board, applied wet, and bent to the shape of the elbow, will answer best, as when dry it adapts itself to the form of the limb, and affords an excellent support.

After three weeks, the surgeon should very cautiously commence the passive motion. Passive motion.

If the fracture in these cases extends without the capsular ligament, a bony union may with care be effected; but when entirely within the capsule, the union, as far as I have seen, is always ligamentous. Bony union.

Of Fracture of the Coronoid process of the Ulna.

The following case which I have for many years related in my lecture, was considered as a fracture of the coronoid process, and will show the symptoms produced by such an injury.

A gentleman in the act of running, fell upon his hand, which he extended to break his fall, and immediately afterwards he discovered that the motions of his elbow joint were greatly diminished, as he could bend the arm but little, nor could he entirely straighten it. His medical attendant in the country, to whom he applied, found the ulna projecting backwards, but that on forcibly bending the arm, the figure of the joint became immediately restored. A splint and bandages were applied, and the arm supported by a sling. Several months afterwards the gentleman came to town, when I saw Case.

him; his ulna still projected behind the condyles of the humerus; but could with little violence be restored to its situation by bending the arm.

Union ligamentous.
Case.

Some time after I had seen this gentleman, I had an opportunity of dissecting a case of this injury, in a subject brought to St. Thomas's anatomical theatre. The coronoid process of the ulna had been broken off within the joint, and had only united by ligament, so as to move freely on the ulna, and to allow the ulna to be carried back between the condyles, when the arm was extended.

Reason of.

I am doubtful if the most careful treatment would effect a perfect cure, as the coronoid process loses its ossific nourishment, and has only a ligamentous support. The vitality of the fractured process of bone is only supported by the vessels of the reflected portions of the capsular ligament, which do not appear sufficient to create a bony union.

Treatment.

In the treatment of this accident, the arm should be kept steadily in the bent position for three weeks, to allow time for the ligamentous union, and to make it as short as possible.

Of Fracture of the Olceranon.

Signs of.

The marks of the injury are generally so

evident, that it can scarcely be mistaken. A swelling takes place at the back of the elbow, which, when pressed, feels soft, and allows the finger to sink in towards the joint; this is between the two extremities of the fractured bone; the detached portion is drawn upwards from the head of the ulna, to the extent of from half an inch, to two inches; it can be readily moved from side to side beneath the integument, and becomes further separated from its former connection when the arm is bent. The patient can bend the arm with ease, but he cannot extend it without great difficulty, and the attempt gives him much pain; without exertion it remains semiflexed. No crepitus can be felt; and the rotatory motion of the radius upon the ulna are perfect. Considerable tumefaction from effusion of blood usually follows this accident, and in a few days the surrounding parts are much discoloured from ecchymosis. The fracture generally occurs about the centre of the process, transversely; but I have seen the bone obliquely fractured.

In dissecting the injured parts, sometime Dissection. after the occurrence of the accident, the portion of the olceranon, still connected to the ulna, exhibits some evidence of ossific deposit, and sometimes the detached part has some slight marks of a similar character;

the cancellated structure is filled with new ossific matter. The capsular ligament is lacerated posteriorly on each side of the olecranon. It appears, therefore, that as soon as the fracture takes place, the action of the triceps muscle draws up the extremity of the process, from half an inch to two inches, according to the extent of laceration of the capsular ligament, and the ligamentous band naturally connecting the olecranon to the coronoid process.

Experiments.

To satisfy myself whether this process when broken would again unite by bone, I tried several experiments upon dogs and rabbits, when I found that if the fracture was transverse, and such as to allow of separation between the fractured ends, by the action of the muscles, the union was always ligamentous; but if the fracture was oblique, and not admitting of separation, the parts were readily united by ossific deposit. The want of bony union, appears, therefore, to depend upon a want of adaption of the broken surfaces, and not upon any deficiency of support, as in the case with the fractures of processes within the capsular ligaments of joints.

Causes.

This fracture may be occasioned by falling upon the elbow, when the arm is bent, or it may take place from the action of the triceps muscle only, during any violent and sudden exertion.

The principle of treatment in these cases Treatment.
 is to render the separation of the fractured extremities of the bone as slight as possible, as the limb is weakened in proportion to the length of the ligamentous union, from the diminished power of the triceps muscle. The arm, if possible, should be placed and fixed in a straight position, and if much swelling and pain exist, leeches and evaporating lotions must be employed for two or three days; and immediately the tumefaction has subsided, a bandage must be applied above the elbow, and another below, having a portion of linen or broad tape placed beneath them longitudinally on each side of the joint; the ends of these pieces of linen or tapes are then to be tightly tied over the rollers, so as to approximate them, and thus bring the broken surfaces together. A splint well padded must be placed on the fore part of the arm and joint, and confined by rollers, so as completely to prevent any flexion of the limb. The bandages about the seat of injury should be kept wetted with the evaporating lotion.

This is the only injury to the elbow joint, in which the straight position is proper.

Passive motion should be very carefully employed about a month after the accident, but not sooner. Passive motion.

When
compound.

When this fracture is compound, union by adhesion should be effected if possible, by approximating the edges of the external wound with adhesive plaister, and placing over this, lint dipped in blood ; the treatment in other respects, will be the same as in the simple injury.

Fracture of the Neck of the Radius.

Very rare. This injury, which is said by some surgeons to be of frequent occurrence, I have never seen ; but I do not mean to deny that it sometimes happens.

When it exists, I should imagine that it would be readily detected by the crepitus, which the rotating of the radius would occasion.

Treatment. The same mode of treatment as that already recommended for fracture of the external condyle, would in such cases be most proper

Of Compound Fractures, and Dislocations of the Elbow Joint.

Not dan-
gerous.

I have known several cases of this nature recover, with a partial ankylosis of the joint ;

if properly treated, the constitutional derangement in consequence of the injury, is not productive of any serious mischief.

A brewer's servant was admitted into Case.
Guy's Hospital, on account of a compound fracture of his elbow joint, attended with considerable comminution of bone. The extent of injury was so great as to induce me to recommend immediate amputation, but I could not by any means persuade the patient to submit to the operation. The limb was therefore placed upon a splint, in a bent position, the bones being easily reduced; the edges of the exterior wound were carefully approximated. He recovered without any untoward symptoms, and retained sufficient motion of the joint, to enable him to resume his former employment.

I have known several other cases in which the patient have recovered, without any severe constitutional sufferings.

In the treatment of this injury, the limb Treatment.
should be kept in a flexed position, as ankylosis to some extent is sure to be the consequence of it, when the position will lessen the inconvenience attending it. If attended with much comminution of bone, the loose portions should be removed before the external wound is closed. In elderly persons, or in those not possessing sufficient power of

constitution to support the suppurative process, the limb should be amputated in the first instance. Otherwise, the edges of the wound should be brought together by adhesive plaister, then covered with lint dipped in blood, and afterwards supported by a bandage moistened with an evaporating lotion.

Of Dislocations of the Wrist Joint.

Dislocations of this articulation may occur in three ways:—

First.—Dislocation of the ulna and radius together.

Second.—Dislocation of the radius alone.

Third.—Dislocation of the ulna alone.

Dislocation of the Ulna and Radius.

Forwards
or back-
wards.

These bones may be displaced from the connexion with the carpal bones, either forwards or backwards. If a person in falling has the weight of the body received upon the palm of the hand, so as to occasion a dislocation, it will be forwards; the radius and ulna resting upon the anterior annular ligament of the carpus; should the fall,

however, be upon the back of the hand, the contrary displacement may be produced.

In each of these cases, two projections are perceptible, anteriorly and posteriorly, one from the extremities of the radius and ulna, the other from the bones of the carpus, which render the detection of either injury easy. Signs of.

The effusion which so frequently follows sprains of the tendons, frequently produces an appearance somewhat similar to that resulting from dislocation ; it may, however, be distinguished from that occasioned by the dislocations, as it takes place gradually, and is rarely found on both sides,—whereas, in the displacement, the projections immediately follow the accident, and appears both anteriorly and posteriorly. Injury resembling dislocation.

These dislocations may be easily reduced, by fixing the fore and upper arm, whilst extension is made from the hand ; immediately that the ends of the bones are separated from each other, the actions of the muscles restore them to their proper situations. When replaced, they must be supported by bandages, and two splints, one placed before and another behind the articulation, reaching from the elbow to the ends of the metacarpal bones, to prevent motion, as well as to protect the injured parts. The fore arm and hand should be placed in a sling. Reduction.

Dislocation of the Radius alone.

- Forwards.** The radius is sometimes thrown from its articular surface anteriorly, so as to rest upon the scaphoid and trapezium, where it forms a projection; the hand is twisted, the inner side of the palm being placed forwards.
- Cause of.** A fall upon the hand, when it is bent back, is the common cause of this injury.
- Reduction.** It may be reduced by the same means as the former dislocation, and will require the same after treatment.

Dislocation of the Ulna alone.

- Backwards.** The displacement of the ulna alone, occurs much more frequently than that of the radius alone; the mode in which the former bone is articulated by means of an inter-articular cartilage, and its not forming a part of the wrist joint, allows of its being more readily thrown from its natural position. It usually projects backwards, and is attended with laceration of the sacciform ligament. It may be easily pressed into its proper situation, but immediately the pressure is discontinued, it again protrudes, as the support of the ligament is destroyed.

In the treatment of the injury, it is, there- Treatment.
 fore, necessary to employ a compress over
 the extremity of the ulna, and then to sup-
 port the bone in its natural position, by
 bandages and splints, as in the former dis-
 location. . .

*Of Dislocations of the Ulna, with Fracture of
 the Radius.*

The ulna is often dislocated forwards, the
 radius being at the same time fractured
 obliquely about an inch above the ar-
 ticulation.

The hand is, in these cases, thrown back- Signs of.
 wards, as in the dislocation of both bones
 forwards; the extremity of the ulna can be
 felt just above the pisiform bone, beneath the
 tendon of the flexor carpi ulnaris, and the
 fractured extremity of the superior portion of
 the radius is situated under the flexor ten-
 dons of the hand.

The reduction in these cases is usually Reduction.
 very difficult, requiring powerful extension;
 and there exists a further difficulty in pre-
 serving the proper position, when the reduc-
 tion has been effected, as the bones are again
 displaced from the slightest cause, unless
 confined by bandages, &c. The extension

should be made as in the former cases, and when the bones have been drawn into their natural situations, two cushions must be placed, one before and the other behind the articulation, and there firmly bound down by a roller ; over these, splints, lined with pads, should be placed, to reach from the elbow to the hand, and secured by a long roller. The arm must be placed in a sling for three weeks, if the patient be young ; or from four to five weeks if aged, before passive motion be resorted to for the purpose of restoring the motions of the joint, which will not be perfectly effected under four or five months.

*Of Compound Dislocation of the Ulna, with
Fracture of the Radius.*

Conse-
quences.

The consequences of this injury are serious or not, according to the degree of surrounding mischief, and the extent of the fracture ; if comminuted, the subsequent inflammation is severe, but otherwise of trifling extent, when judicious treatment is adopted.

Reduction

The reduction is to be accomplished as when the simple dislocation and fracture occur ; the edges of the wound must be carefully approximated, and every means taken to promote adhesive inflammation, and to

keep it within bounds by evaporating lotions, and the employment of leeches if necessary. The arm must be laid on a splint, and supported by a sling. The dressings should not be disturbed so long as the patient remains free from suffering, or until the wound has united; should symptoms of suppuration occur, the removal of part of the dressings may be sufficient to allow the escape of the pus, without taking off the whole.

Dislocation of the Carpal Bones.

This injury is of very rare occurrence.

Very rare.

An elderly woman was admitted into Guy's Hospital, in consequence of an accident to her wrist, produced by a fall upon the back of her hand; the radius was found to be fractured obliquely through its inferior extremity, and the part thus separated from the shaft of the bone, was thrown backwards upon the carpus with the scaphoid bone. The fingers could be extended, but not entirely flexed. The reduction was readily accomplished by extension and steady pressure, and the part supported by splints. Leeches and evaporating lotions were employed at first, to subdue the inflammation and tumefaction which followed the injury, and afterwards, further support was given by strips of soap plaister.

Case.

Ganglia. I have known ganglia, which so frequently form about this part, several times mistaken for displaced bones, but a little attention to the history of the case will readily explain the difference.

Partial dislocation Relaxation of the carpal ligaments will sometimes admit of a partial dislocation of some of the bones, when the joint is forcibly flexed; and this state is generally accompanied with great debility of the part, preventing the patient from any continued exercise of it.

Treatment. Moderate pressure and support are the best means of relieving such complaints, the use of friction and of cold water poured from a height upon the part, I have known of service.

Of Compound Dislocation of the Carpal Bones.

Causes. This frequently happens from the bursting of guns, or from the hand and wrist being caught in machinery, and in such cases, one or two of the carpal bones may be removed, and a considerable degree of motion be afterwards preserved in the articulation; but, if attended with extensive surrounding mischief, amputation should be performed.

The following case occurred under the care Case. of Mr. Forster, in Guy's Hospital. Richard Mitchell, aged 22, was admitted into the Hospital in consequence of an extensive wound into the wrist joint, inflicted by a wool combing machine. Two-thirds of the joint were opened, and the surrounding soft parts had suffered considerably. The scaphoid bone was dislocated backwards, and nearly separated from its usual connexions; the extensor tendons of the thumb, of the fore and middle fingers were torn through, as was also the radial artery, which, however, did not bleed much. The scaphoid bone was removed, and the edges of the wound were approximated by sutures, and adhesive plaster applied in strips; the whole was covered by lint dipped in blood, and supported upon a splint to prevent any motion of the joint; a small quantity of blood was taken from the arm, and the seat of injury kept moistened with an evaporating lotion. In two or three days it became necessary to remove these dressings in consequence of suppuration, when a poultice was applied. A small slough which had formed, separated kindly, and the process of granulation went on without a check, so as to fill up the wound in the course of three weeks. His recovery was somewhat retarded by the occurrence of a pulmonary

affection, requiring the use of leeches, diaphoretics, &c. to which it yielded. He left the Hospital, with but little motion of the fingers, but this appeared to be gradually increasing.

Dislocation of the Metacarpal Bones.

Articulation
strong.

The articulation of these bones with the carpal is so strong, that great violence is requisite to separate them. I have seen them displaced from the bursting of guns, or the passage of a heavy laden carriage over the hand.

Removal of
bones.

In these cases, one or more of the metacarpal bones may be removed without amputating the whole hand.

Case.

I amputated the middle and ring fingers, with their metacarpal bones, from the hand of a Mr. Waddle, of Cheapside, in consequence of their being extensively injured by the bursting of a gun. I brought the edges of the wound together by sutures, and approximated the fore and little fingers by a roller; the wound united readily, and he had afterwards a very useful extremity.

Case.

A boy was admitted into Guy's Hospital with a very severe injury to the hand, from the bursting of a gun, by which all the

metacarpal bones, excepting that of the fore finger, were so shattered, as to render it impossible to save them. The thumb had been entirely separated, with its metacarpal bone, and the trapezium was so much injured, that I thought it proper to remove it; I therefore took it away, as well as the metacarpal bones of the middle, ring, and little fingers, with the fingers themselves; thus only leaving the fore finger with its metacarpal bone. He recovered quickly, and could use this finger as a hook with the greatest facility and advantage.*

Fracture of the Head of the Metacarpal Bone.

The digital extremity of a metacarpal bone, which is called the head, is sometimes broken off, and gives rise to an appearance of dislocation, but the crepitus, on exami- Seat of.

* A case somewhat similar to the above, occurred under my care in St. Thomas's Hospital, in which I was obliged to amputate the little and ring fingers from the injured hand, with their metacarpal bones. I also removed the unciform bone, and the middle finger, with two-thirds of its metacarpal bone. The recovery was gradual, but complete, and the patient can now use his thumb and fore finger very expertly.—T.

nation, makes the nature of the accident very evident.

Treatment. In the treatment of this accident, the patient should be made to grasp a large ball of firm materials, and over this his hand should be confined by a roller ; this is the best method of restoring the fractured bone to its natural position.

Dislocations of the Fingers.

Common seat of. The most frequent seat of this displacement is between the first and second phalanges ; but it is not an accident of common occurrence.

Nature of. The dislocation may occur either backwards or forwards, when the projections formed by the ends of the bones plainly indicate the nature of the injury.

Reduction. If recent, the reduction may be easily accomplished, by making extension with a slight inclination forwards, to relax the flexor muscles ; if of some days standing, a long continued, and steady extension, is necessary to replace the bones. It has been recommended, in cases of difficulty, to divide the ligaments or tendons, but I have seen too much mischief result from injuries to these parts, ever to advise such a practice.

The same observations are applicable to the dislocations of the toes, but rather more difficulty is experienced in the reduction, on account of the shortness of the phalanges.

Remarks
apply to
injuries
of toes.

Of Dislocation from Contraction of the Tendon.

The phalanges are sometimes drawn out of their proper positions, by the contraction of a flexor tendon and its theca, in consequence of a chronic inflammation, induced by excessive employment of the hand in rowing, ploughing, hammering, &c.; nothing can be done to relieve these cases, but when merely a single band of fascia is thickened, and produces this deformity, it may be divided with much advantage by a narrow bistoury, introduced by a small opening through the skin. A splint must afterwards be applied, to keep the finger straight during the healing of the wound.

Cause.

A similar contraction also occurs in the tendons of the toes from the wearing of tight shoes; the projection of the first and second phalanges, in these cases, often gives rise to so much suffering and inconvenience, as to make it necessary to amputate the toe, otherwise the patient cannot take necessary exercise, and is deprived of many enjoyments.

In the toes.

The cases in which I have performed the operation, have generally done extremely well, and restored the patients to comfort.

Dislocations of the Thumb.

Muscular
connexion
strong.

The number of strong muscles connected with the bones of the thumb, render the reductions of their dislocations very difficult, especially when much time has been allowed to elapse from the receipt of the injury.

Dislocation of the Metacarpal from the Carpal Bone.

Form of.

In the majority of cases in which I have witnessed a displacement of the metacarpal bone of the thumb from the trapezium, the former has been thrown inwards towards the metacarpal bone of the fore finger. The thumb has been bent backwards, and the extremity of the bone has formed a projection in the palm of the hand; it has been attended with considerable pain and tumefaction.

Reduction.

In making the extension for reduction, it is particularly necessary to attend to the relaxation, as far as possible, of the most

powerful muscles, which are the flexors, thus the thumb must, during the process, be inclined towards the palm of the hand. The force applied must be continued and steady, as violence will not effect the desired object.

If simple extension does not succeed in reducing the dislocation, the part must be left to the degree of recovery which nature will effect, as it would be improper to attempt relief by any division of muscles or tendons.

A compound dislocation may be produced at this articulation by the bursting of a gun, and in such a case, if the tendons are not lacerated, the dislocation should be reduced, which it can be easily, and the edges of the external wound should be brought together by suture, when, with careful treatment, a good cure may be effected.

Compound
dislocation.

A case of this kind occurred at Brentford, under the care of Mr. George Cooper, in a young gentleman, aged thirteen; the injury was occasioned by the bursting of a powder flask in his hand. The mass of muscle connecting the thumb to the hand was torn through, but the tendons of the long flexor, and of the extensors were not injured. The dislocation was reduced, and the wound closed by sutures and adhesive plaister, over which an evaporating lotion was applied. The wound united in part rapidly, and the

Case.

remaining portion healed kindly by granulation. Two weeks after the receipt of the injury, Mr. Cooper began the use of passive motion, and the patient ultimately gained perfect motion in the joint.

Amputation
required.

Should, however, the tendons be lacerated, or much surrounding mischief exist, amputation will be required ; and I have found it necessary, in such a case, to remove the articular surface of the trapezium, which I think may be done with advantage, especially when there is a scarcity of superficial soft parts.

Dislocation of the First Phalanx.

Simple.

In the simple dislocation at this articulation, the first phalanx is thrown back upon the metacarpal bone, forming a projection there, whilst the end of the metacarpal bone protrudes towards the palm of the hand ; the motions of the joint are destroyed, although the thumb can be made to approximate the fingers by the movements of the carpo-metacarpal articulation.

Reduction.

The mode of applying the extension for the reduction of this dislocation, should be as follows, and the direction should be towards the palm of the hand, to relax the

flexor muscles. The hand should be soaked in warm water for a considerable time, to relax the soft parts as much as possible, then a piece of soft leather wetted, should be placed closely around the first phalanx, and over this a portion of tape, two or three yards in length should be fixed by the clove hitch, (a knot, so called by sailors.) An assistant should next firmly hold the metacarpal portion of the thumb, by passing his fore and middle finger between the patient's fore-finger and thumb, whilst the surgeon draws the first phalanx from the metacarpal bone, in a direction somewhat inwards to the palm of the hand.

If the above plan does not succeed, the following should be adopted:—The leather and tape being applied as before, a strong worsted tape should be passed between the patient's fore-finger and thumb, and this should be tyed to a bed post, around which the arm should be bent; a pulley being then fixed to the tape connected to the first phalanx, a gradual and steady extension should be made, which will generally effect the reduction.

Another method.

When the above described means have been fairly tried, without success, it will be best to leave the case to nature, when the patient will, after some time, acquire a great degree of motion.

Sometimes not reduced.

When
compound.

In cases of compound dislocation, should the reduction be difficult, a part of the extremity of the bone may be removed by amputation; and the patient may afterwards obtain a useful joint, by the early employment of passive motion.

Of Dislocation of the Second Phalanx.

Easily de-
tected.

In a simple dislocation of this kind, the nature of the injury can scarcely be mistaken, and the reduction may be accomplished in the following way:—The surgeon should grasp the back of the first phalanx with his fingers, and apply his thumb upon the forepart of the dislocated phalanx, and then flex it upon the first as much as possible.

Treatment
of com-
pound.

The treatment of the compound dislocation of this articulation, is the same as that recommended for a similar accident in the first phalanx; but the ends of the tendon should be made smooth by the knife, when, by careful approximation they will unite. Passive motion may be used in two or three weeks.

LECTURE XLIII.

Dislocations of the Hip Joint.

The head of the femur may be thrown from the acetabulum in four directions.

First.—Upwards, upon the dorsum of the ilium.

Second.—Downwards, into the foramen ovale.

Third.—Backwards and upwards, in the ischiatic notch.

Fourth.—Forwards and upwards, upon the body of the pubes.

A displacement downwards and backwards A fifth form. has been described by some surgeons, but I have never had an opportunity of witnessing it, and I am inclined to believe that some mistake exists about this injury, although I do not mean to deny the possibility of its occurrence.

*Dislocation Upwards and Backwards on the
Dorsum Ilii.*

The most
common.

This is the most common of the displacements of the hip joint, and is marked by the following signs:—

Signs of.

The limb on the injured side is from one inch and a half, to two inches and a half shorter than the sound limb. The knee and foot are turned inwards; the knee being a little advanced upon the other, and the great toe rests upon the tarsus of the other foot. The motion outwards is destroyed, so that the leg cannot be separated from the other, but the thigh may be a little bent across the sound limb. The head of the bone may be felt, and seen to move, upon the dorsum of the ilium, if the knee is rotated inwards; excepting when the injury gives rise to extensive extravasation of blood; the trochanter major is thrown much nearer than usual to the anterior superior spinous process of the ilium, so as to render the rotundity of the injured hip much less than that of the sound side. The chief marks will therefore be; difference in length, change of position, diminution of motion, and loss of projection or rotundity from the altered position of the trochanter major.

The accident with which this dislocation is most liable to be confounded, is the fracture of the neck of the thigh bone within the capsular ligament. The distinguishing marks are, however, sufficient to prevent any mistake, if common attention be paid to the case. In the fracture of the neck of the thigh bone, the knee and foot are usually turned outwards, and the trochanter is drawn upwards and backwards upon the dorsum of the ilium; the limb which is shortened one or two inches by the contraction of the muscles, can be restored to the same length as the other by slight extension; but the shortening immediately recurs when the extension is abandoned; and the limb may be readily flexed, although it creates much pain. On rotating the limb, when extended, a crepitus can be felt, which is not perceptible whilst the limb is drawn up. This fracture rarely happens, but in old persons, and is generally the effect of a very trifling injury; it occurs, however, much more frequently than the dislocation.

Fracture of
the cervix.

Thus the greater mobility of the joint, the ease with which the length of the limb is restored; and the perception of crepitus during rotation, when the limb is extended, furnish ample marks of distinction between the two injuries.

Diseased
hip.

The alterations in the figure of the joint produced from inflammation and ulceration, can hardly be mistaken for dislocations from violence, excepting by persons ignorant of anatomy, and but little attentive to their professional duties. The gradual progress of the symptoms, the pain in the knee, the increased length of the limb at first, and the marked shortening afterwards; the extent of motion, but the sufferings created by any extreme movement, are differences which would hardly escape the notice of the most careless observer. The consequences of this disease, when of long standing, are ulceration of the head of the bone, ligaments, and acetabulum, accompanied with such a change of situation of the parts, as sometimes to present the appearances of dislocation, but the history of the case will readily inform the surgeon of its true nature.

State of
muscles.

In the dislocation upon the dorsum of the ilium, the pyriformis and glutei muscles, the triceps, the pectineus, the psoas magnus, and iliacus internus, the rectus, the semitendinosus, and membranosus, the obturator externus, and one head of the biceps are all shortened. The obturator internus, the gemini, and quadratus femoris are all stretched. The triceps and glutei chiefly oppose the reduction.

This dislocation is occasioned by a fall or Cause.
blow when the limb is turned inwards.

The reduction may be accomplished in the following manner: bleed the patient to the extent of from twelve to twenty ounces, or even more if he be very robust, then place him in a warm bath, at the temperature of 100° , and gradually increase the heat to 110° , until he faints: and to accelerate the faintness, give him in solution a grain of tartarized antimony every ten minutes, until nausea is excited. When faint, remove him from the bath, envelope him in blankets, and place him between two strong posts, about ten feet asunder, and in which two staples are fixed; or rings may be fixed in the floor, and the patient laid between them. He should be placed upon his back, and covered well with blankets. A strong girt should then be passed between the thighs, close to the upper and inner part of the injured limb, and the ends of this should be fastened to one of the staples. A wetted roller should next be placed tightly on the lower part of the thigh, just above the knee of the injured limb, and upon this a leather belt, with straps and rings affixed for the attachment of the pulleys, should be closely buckled. The knee should be slightly bent, and the thigh directed across the sound one just above the

Mode of
reduction.

knee. The pullies must be attached to the straps of the belt, and to the other staple. The surgeon now should gradually and carefully commence the extension, and continue it until the patient begins to complain of pain, when he should rest a little, without relaxing, so as to fatigue the muscles; having waited a short time, he should again draw the cord, and when the patient again complains, he should again suspend the extension, and so on, until the muscles yield, and he finds the head of the bone is brought near to the acetabulum, when he should give the string of the pullies in charge to an assistant, with directions to keep up the extension, whilst he himself rotates the knee and foot gently, under which motion the reduction will be usually accomplished. When the pullies are used, the head of the bone does not generally return into the acetabulum with a snap, as the muscles, from continued extension, have not sufficient power remaining to allow of any powerful contraction; thus the surgeon can only be assured of the accomplishment of the reduction, by the restoration of the figure of the part, and by loosening the pullies and examining the joint.

It sometimes happens, that the bandages get loose before the extension is sufficient, when they should be carefully re-applied, but

in as short time as possible, to prevent the muscles from recovering their original tone.

When the head of the femur has been brought by the extension to the edge of the acetabulum, the rotatory motion above-mentioned, is not always sufficient to promote the reduction, but the head requires to be lifted over the lip of this cavity; this may be performed by passing a towel or napkin as near to the joint as possible, at the upper part of the thigh, and by it an assistant may raise the upper part of the bone from the surface of the ilium.

Head of
bone lifted.

When the reduction has been accomplished, the patient must be very carefully removed to bed, in consequence of the risk of further displacement, from the very relaxed state of the muscles.

The reduction of this dislocation may be completed, in a very recent case, before the muscles have had time to contract, by extension made in a direction, not under other circumstances, well adapted for this purpose; and I have seen it thus effected:—The mode described by Mr. Hey, if I understand it correctly, appears to me but little calculated to succeed, unless in a very recent case; but I state this with great deference, as no one can have a higher opinion of the talents and professional acquirements of Mr. Hey,

In recent
cases.

than myself, and I am not certain that I do understand, in all respects, the description of the method which he adopted.

Result of
experience.

The plans which I have recommended, are the result of considerable experience, both in public and private practice; they have rarely failed even under the most unfavourable circumstances; some slight deviation from them may be occasionally required, from some difference in position, but this will only be an exception to a general rule, and will occur but very seldom.

I shall relate some cases in confirmation of what I have advanced.

These first cases not only illustrate the mode of treatment detailed in the preceding observations, but particularly explain the benefits to be obtained by the employment of the pullies, and the assistance of constitutional treatment.

Case.

I am indebted to Mr. Bennett, surgeon, at Chester, for the history of the following case. John Forster, aged twenty-two years, had his thigh dislocated in consequence of a cart passing over his pelvis, and was admitted into the Chester Infirmary July 10, 1818, soon after the receipt of the injury. The nature of the injury was well marked. The patient being placed upon a table, extension was made by pullies for fifty minutes without

success. He was then placed in the warm bath for twenty minutes, after which the extension was repeated for a quarter of an hour, but still without the desired effect. He was then bled to the amount of twenty-four ounces, and he took forty drops of tincture of opium, but as this did not create faintness, the solution of tartar emetic was exhibited in small and frequent doses; this soon produced nausea and faintness, during which a steady extension for ten minutes accomplished the reduction.

Mr. Nott, of Collumpton, Devon, sent me the following particulars:—

John Lee, aged thirty-three, a very stout Case. man, dislocated his left hip by a fall, October 9, 1819, but was not seen by Mr. Nott until the 4th of December following, just eight weeks after the accident, the effects of which still remained, exhibiting distinctly the usual appearances. The bandages and pullies being applied, extension was gradually made, and at the time of its commencement, the solution of tartar emetic was given him, and repeated every ten minutes, but without creating much nausea. The extension still being continued, he was bled to the extent of sixty ounces, but without producing syncope. The extension was kept up for two hours, when an evident alteration

was perceptible in the injured limb; the head of the bone was elevated by means of a towel under the upper part of the thigh, and the limb was rotated; soon after this period a grating was heard from the situation of the head of the bone, and the man immediately exclaimed that the limb was reduced; and this, on relaxing the pullies, we found to be correct; before removing him to bed his legs were bound firmly together to prevent any recurrence of the displacement, and a large blister was applied over the trochanter. When he was first allowed to rise from his bed, a bandage was applied upon the thigh and pelvis; passive motion was previously employed. In five weeks after the reduction he walked nearly twenty miles without inconvenience.

The above case shews that the reduction may be effected by skilful management a considerable time after the receipt of the injury. And this is further confirmed by cases related by Mr. Mayo, and Mr. Tripe, of Plymouth, in each of which the dislocations had existed seven weeks before the reductions were accomplished.

Without
pullies.

The following cases prove that this dislocation may be replaced without the use of the pullies, but at the same time shew how desirable their assistance would have been.

Mr. Holt of Tottenham requested me to Case.
 visit, with him, Mr. Piper, aged twenty-five
 years, who was the subject of dislocation of
 the thigh upon the dorsum of the ilium, but
 which had existed a month previous to his
 coming under the care of Mr. Holt. Mr.
 Holt and myself, assisted by five powerful
 men, used our utmost exertions to replace
 the bone, and we were several times obliged,
 from fatigue, to relax, and renew our at-
 tempts. After repeated trials, for fifty-two
 minutes, we succeeded in effecting the re-
 duction, when we had determined to make
 but one more effort.

Another case, which I attended with Mr. Case.
 Dyson of Fore-street, was reduced without
 the use of pullies, but with so much violence,
 and such unequal extension, that I am sure
 no surgeon, who had seen the pullies em-
 ployed in reducing this form of dislocation,
 would have recourse to any other method.

Mr. Oldnow, of Nottingham, sent me the Case.
 particulars of a case in which the reduction
 was effected without the assistance of pullies,
 but in which an extension was made from
 the ankle, the pelvis being secured by tow-
 els. The dislocation was recent, and the
 reduction easy.

The head of the bone is thrown below, and rather anterior to the axis of the acetabulum; and a depression exists below Poupart's ligament.

Situation of the bone.

The dislocation is produced by a fall or blow when the legs are much parted from each other.

Cause.

The mischief occasioned by this injury is extremely well shewn by a preparation in the Museum of St. Thomas's Hospital which I dissected many years ago. The head of the os femoris rested in the foramen ovale, which is entirely filled by bone, the external obturator muscle and the ligament, naturally occupying this space, being absorbed; bony matter had been also extensively deposited around the edge of the foramen, so as to form a deep socket, which enclosed the head of the bone, so that it could not be removed without breaking the cup, but still allowing of considerable motion; the interior of this socket was perfectly smooth. The acetabulum was half filled with ossific matter, and so much altered as not to be capable of containing the head of the thigh bone, which was but little changed, its articular cartilage still remaining perfect. The ligamentum teres was completely torn through, and the capsular ligament partially lacerated. The pectinalis and adductor brevis muscles had been torn,

Dissection of.

but had united by tendon, the psoas, iliacus internus, and pyriformis muscles, were all stretched.

Ligamentum
teres torn.

It has been supposed that the ligamentum teres was not lacerated in this dislocation, because, in the dead subject, the head of the bone can be drawn over the lower edge of the acetabulum, if the capsular ligament be divided whilst the round ligament remains uninjured; but as the dislocation occurs when the thighs are wide apart, and the ligament is upon the stretch, when the head of the bone is thrown from the acetabulum the ligament is torn through before the dislocation is complete.

Reduction
if recent.

In recent cases the reduction of this dislocation may be easily accomplished by the following means. The patient being placed upon his back, and his thighs being separated as widely as possible, pass a girt between the upper part of the injured limb and the pudendum; and let the ends be fixed to a staple in the wall of the room; then grasp the ankle of the dislocated extremity, and draw the limb over the sound one, and thus the head of the bone will slip into its proper cavity. Placing the patient upon a bed, so that one of the bed-posts is received between the upper part of the thighs, and then forcing the injured limb across the sound one, will

also effect the same purpose. Sometimes, however, it will be found necessary to place a second girt or bandage round the pelvis beneath that which I have already described, and the ends of this second girt should be fixed to a hook or staple on the sound side of the patient, to prevent any lateral motion of the pelvis at the time that the injured extremity is drawn across the sound limb, otherwise the motion of the pelvis following that of the limb may prevent the reduction.

Should the dislocation have existed for three or four weeks before any attempt is made to reduce it, the patient should be placed upon the sound side, and his pelvis fixed by one bandage, whilst another is placed under the upper part of the dislocated thigh, and connected to the pullies above so as to act perpendicularly; the surgeon should then press upon the knee and leg to prevent their being drawn up with the superior portion of the thigh bone, at the same time that an assistant elevates this latter part, by drawing the cord attached to the pullies. Great care must be taken not to press the leg and knee too much, or the head of the femur will be forced backwards into the ischiatic notch, for the power of the lever which is employed is very great.

Of long
standing.

The following case was communicated to me by Mr. Daniell.

Case. Mr. Thomas Clarke, aged fifty, received an injury to his hip in consequence of a fall from his cart in endeavouring to stop the horse, which had run away with him. Between two and three weeks after the accident, Mr. Potter, of Ongar, in Essex, was requested to visit the patient, and Mr. Daniell being on a visit to Mr. Potter at the time, accompanied him to see the case.

On examining the injured limb, it was found to be three inches longer than the sound one, the knees were separated, and the foot turned a little outward; when the patient endeavoured to stand, his body was bent forwards.

The nature of the injury being thus extremely evident, the following means were resorted to effect the reduction of the dislocation. The patient being robust, some blood was first taken from his arm, but as this did not sufficiently reduce his powers, a solution of the tartar emetic was given to him. He was then placed on his side, near to the edge of the bed, and a girt being passed round his pelvis, was carried through the frame of the bedstead and fixed, so as to prevent any movement of the body; a second girt was

passed between the thighs, and fixed to the pulleys above the upper part of the injured limb. Whilst the extension was making Mr. Potter rotated the limb, and drew the knee towards that on the sound side. When these means had been continued for about ten minutes, the effects of the tartar emetic became excessive, and in five minutes afterwards the head of the bone returned to its original socket with a snap; the patient was then placed in bed, and the injured parts supported by a roller. He speedily recovered the use of his limb.

Of the Dislocation backwards, or into the Ischiatic Notch.

In describing this dislocation, some surgeons have considered the head of the os femoris as being thrown backwards and downwards; which must have arisen from their not recollecting the natural position of the os innominatum in the skeleton. This notch which gives passage to the pyriformis muscle, and also to the gluteal, ischiatic and internal pudental arteries, with the sciatic nerve, is naturally situated a little above, as well as behind the acetabulum, so that the head of the thigh bone when displaced into this

Common
description
wrong.

space, is placed upwards as well as backwards, with respect to the acetabulum ; and this you must carefully bear in mind.

Situation
of bone.

The head of the os femoris in this dislocation is situated on the pyriformis muscle, between the edge of the bone which forms the upper part of the ischiatic notch, and the sacro sciatic ligaments.

Difficult to
detect.

Of all the dislocations of the thigh, this is the most difficult to detect, because the length of the limb is but little altered, and the change in the position of the knee and foot is not so marked as in the dislocation upwards. It is also more difficult of reduction because the head of the bone is placed deeply behind the acetabulum, and requires to be lifted over the edge, as well as drawn towards it.

Signs of.

The dislocation is marked by the following signs :—The limb is from half an inch to one inch shorter than the sound one, but rarely more than half an inch. The natural projection formed by the trochanter major is diminished, and is inclined towards the acetabulum, but still remains at right angles with the ilium. The head of the bone can only be felt in very thin persons, and then not very distinctly. The knee and foot are turned inwards, and the great toe rests against the ball of the great toe of the sound limb. When the patient is erect the toe touches the

ground, but the heel does not quite reach it, and the knee is bent and projects a little forwards. The motions of the joint are in a great degree prevented, admitting but of slight flexion and rotation.

There is in the collection at St. Thomas's Hospital, an excellent specimen of this injury, which I met with accidentally in the dissecting room. The original acetabulum is entirely filled by a ligamentous substance, so that it could not have again received the head of the femur; the capsular ligament is torn anteriorly and posteriorly; the round ligament is torn through; the head of the bone rests in the situation I have before described; but there is not any appearance of an endeavour to form a new socket for its reception. A new capsular ligament surrounded the head of the bone, but it has been opened and turned down to exhibit the head, with the lacerated portion of the ligamentum teres connected to it.

This displacement occurs from the application of violence when the thigh is bent at right angles with the body, so that the knee is forced inwards. Cause.

The reduction, which is extremely difficult, is best effected in the following manner:— Reduction. !
Place the patient on a table upon his sound side, and fix the pelvis by passing a girt

It is a dislocation of the femur. The head of the femur is displaced upwards & backwards. The capsule is torn, but the ligamentum teres is not. The head of the bone is displaced upwards & backwards. The capsule is torn, but the ligamentum teres is not.

between the pudendum and inner part of the thigh, and making it fast to some firm point; then apply a wetted roller round the limb above the knee, and over it buckle the leather strap, and place a towel under the upper part of the injured thigh. The extension should then be commenced with the aid of the pullies, so as to draw the dislocated thigh forwards in a direction over the middle of the sound one, measuring from the pubes to the knee; when this has been continued for a short time, an assistant should elevate the upper part of the bone, by drawing the towel with one hand, whilst he presses on the pelvis with the other; and by this means he will lift the bone over the brim of the acetabulum. A round towel passed under the upper part of the thigh, and over the shoulders of the assistant, will allow him to employ more force for this purpose, by raising his body at the same time that he rests both hands upon the pelvis of the patient.

Another
mode.

I have known another method succeed in effecting a reduction of this dislocation, although the one I have described is the best.

Case.

A man, aged twenty-five, was admitted into Guy's Hospital, under the care of Mr. Lucas, on account of a dislocation of his thigh backwards. An extension was made by

means of the pullies, drawing the limb in a line with the body, and at the same time thrusting the trochanter major forwards with the hand ; the reduction was accomplished in about two minutes.

The reduction is generally indicated by a snap which takes place when the head of the bone returns into the acetabulum ; but when the muscles have been some time contracted, and when an extreme state of nausea has been produced by bleeding, and the tartar emetic, the reduction is not accompanied by any noise, as in the following case, the particulars of which were given to me by Mr. Worts, a dresser to Mr. Chandler, at St. Thomas's Hospital.

Signs of
reduction.

James Hodgson, aged thirty-eight, a strong muscular man, was admitted into St. Thomas's Hospital, on Tuesday, February 8, 1820 ; his left thigh being dislocated backwards. On account of the great swelling which existed at the time of his admission, the nature of the injury was not considered sufficiently evident, and merely evaporating lotions were applied. On the 12th the patient was seen by Mr. Chandler and Mr. Cline, and the latter thought it a case of dislocation. On the 14th Mr. Chandler requested me (Sir Astley) to see the case, when I immediately declared it to be a dislocation into the ischi-

Case.

atic notch, and directed that the man should be bled, as he suffered considerable pain, and the tension about the injured part was still very great. On Saturday the 19th, the pain and swelling having subsided, means were employed to effect the reduction. After bleeding the patient largely, and giving him the tartar emetic, the bandages and pullies were applied as I have already directed, and the extension conducted in the same manner. The extension was continued for about ten minutes before any attempt was made to raise the head of the bone, but it was then tried, and at the same time the limb was rotated by turning the knee outwards. After the expiration of a quarter of an hour, the appearance of the hip became much altered, and of its natural shape; but as no snap had been heard, the same means were continued for twenty-five minutes longer, when, in consequence of the strap above the knee becoming loose, the pullies were removed, and it was then discovered that the reduction was accomplished; but it had occurred without either the bye-standers or the patient being aware of it.

Of the Dislocation on the Pubes.

This is more readily detected than any other of the dislocations of the thigh. Easily detected.

It generally happens by the foot slipping unexpectedly into some hollow, whilst a person is walking, the body being at the time bent backwards, so that the head of the os femoris escapes forwards. Cause.

The following signs usually indicate this displacement; the injured limb is an inch shorter than the sound one; the knee and foot are turned outwards; but what renders it so evident, is the readiness with which the head of the bone can be felt a little above the level of Poupart's ligament, upon the pubes, on the outer side of the femoral artery and vein, it there forms a round hard swelling, which moves when the thigh is bent. Signs of.

Although so easy to distinguish, yet I have known three cases in which the injury has been overlooked, until too late to afford relief; this could only have arisen from great carelessness, or excessive ignorance. Mistaken.

A preparation from one of these neglected cases, which I had an opportunity of dissecting, is preserved in the museum at St. Thomas's Hospital. It presents the following appearances:—The acetabulum is in part Dissection of.

filled by a new deposit of bone, and is in part occupied by the trochanter major, but both are very much altered. The capsular ligament is very extensively torn, and the ligamentum teres entirely divided. The head of the bone is placed on the pubes under Poupart's ligament, which has been thrust up by it; the iliacus internus and psoas magnus muscles, are stretched over the neck of the bone, and upon them is the anterior crural nerve. Both the head and neck of the bone are flattened, and the latter rests in a new articular cavity formed for it upon the pubes, above the level of which the head of the femur is situated. The edges of the new acetabulum project upon each side of the neck of the bone, so as to confine it laterally, whilst Poupart's ligament confines it upon the fore part. The femoral artery and vein pass close to the inner side of this cavity, for the cervix of the femur.

This injury might be mistaken for a fracture of the neck of the bone, but only through great carelessness and inattention.

Reduction
of.

The reduction of the dislocation may be accomplished in the following way:—Place the patient upon a table on his sound side; then pass a girt between the pudendum and the upper and inner part of the injured limb, and fix this to a staple rather before the line

See also 381 and 382 & Extension with fabric.

of the patient's body. The wetted roller, strap, buckles and pulleys, should then be placed above the knee, as before described for other displacements. The extension is to be made backwards and downwards. The application of the towel at the upper part of the thigh, and lifting the head of the bone by it, over the edge of the acetabulum, is also necessary in reducing this form of displacement.

The following case, which will illustrate the mode of reduction, occurred under the care of Mr. Tyrrell, at St. Thomas's Hospital.

Charles Pugh, aged fifty-five, was admitted Case. into St. Thomas's Hospital on the 23rd of January, 1823, with a dislocation of the right thigh, which had been produced by a blow upon the back part of the thigh, from a cart wheel, at the time he was making water at the corner of a street, and unprepared to resist the violence. The head of the bone could be distinctly felt below Poupart's ligament, immediately to the outer side of the femoral vessels. The foot and knee were turned outwards, with very little alteration in the length of the limb. The thigh was not flexed towards the abdomen, and was nearly immoveable, admitting only of slight abduction and adduction, also a little rotation outwards, but not at all inwards. It was

speedily reduced by the following means:—The patient was placed on his left side, a broad band was placed between his thighs, and being tied over the crista of the ilium on the right side, was made fast to a ring in the wall. A wet roller having been put on above the right knee, a bandage was buckled over it, and its straps attached to the hooks of the pullies, by which a gradual extension was made, drawing the thigh a little backwards and downwards. When this extension had been kept up a short time, another bandage was applied round the upper part of the thigh, close to the perineum, by means of which the head of the bone was raised, and in the course of a few minutes the reduction was easily accomplished. The patient had not been bled nor taken any medicine; he suffered but little after reduction, and was able to walk without pain or inconvenience five or six days afterwards.

Frequency
of the dif-
ferent dis-
locations.

From what I have observed respecting the comparative frequency of the dislocation of the thigh, I should think the proportion in twenty cases about as follows:—twelve on the dorsum ilii; five in the ischiatic notch; two in the foramen ovale; and one on the pubes.

Formerly
over-look-
ed.

Considering the frequent occurrence of these dislocations, it is extraordinary that

they should have escaped the observations of former surgeons ; it can only be accounted for by the difficulties which existed in the pursuit of morbid anatomy. I was informed by Mr. Cline, that Mr. Sharpe, a surgeon of Guy's Hospital, possessing considerable eminence, and author of a "Treatise on Surgery," did not believe that these displacements ever took place.

There is great pleasure in contrasting the present state of professional information with that which existed fifty years ago. Our provincial surgeons now readily detect these injuries, and generally succeed in reducing them. Let us never, however, forget that it is to the knowledge of anatomy, and more especially, of morbid anatomy, that we are indebted for this superiority ; and therefore we should never neglect or lose an opportunity of pursuing our investigation on these points, if we wish to increase our reputations as surgeons, and practise our profession with credit.

Now readily
recognized.

*Injuries liable to be mistaken for Dislocations
of the Hip.*

Of Fractures of the Os Innominatum.

In these cases the application of the force

necessary to reduce a dislocation, increases excessively the patients sufferings, and destroys the probability of recovery, if any previously existed.

Signs of.

When a fracture occurs of the os innominatum, which extends through the acetabulum, the head of the os femoris is drawn upwards, and the trochanter major is turned a little forwards; thus the leg is somewhat shortened, and the knee and foot are a little inverted, resembling the appearances produced by a dislocation into the ischiatic notch.

When the sacro iliac junction is broken through, and the pubes and ischium are fractured, the limb is in a great degree shortened; but the position of the knee and foot is not altered.

Differ from
dislocation.

These injuries do not affect the motions of the hip joint so much as dislocations, and a crepitus can be felt if the limb be moved whilst the hand rests upon the crista of the ilium.

I have seen three cases of fracture of the os innominatum, somewhat resembling dislocations, two in which the injury extended through the acetabulum, and one in which this cavity remained uninjured; the following are principal features of these cases.

Case.

In the year 1791, a man was admitted into St. Thomas's Hospital, on whom a hog'shead

of sugar had fallen. When examined, his right leg and foot were found inverted, and the limb appeared shorter than the left by two inches. Whilst making a gentle extension to endeavour to bring the injured limb to an equal length with the perfect extremity, a crepitus was discovered in the os innominatum. The patient was exceedingly pallid, his muscular power extremely feeble, and he appeared rapidly sinking. He expired the same evening. The following appearances presented themselves when the body was examined :—The deep part of the acetabulum was broken off, so as to allow of the escape of the head of the thigh bone from the cavity; the neck of the bone was firmly embraced by the tendon of the obturator internus, and by the gemini; the junction of the pubes at the symphysis had been separated, and the bones were nearly an inch apart; the ilium, ischium and pubes were fractured, and the fracture extended through the acetabulum; the left kidney was much injured, and about a pint of blood was found extravasated into the cavity of the abdomen.

In the second case, which also was in St. Case. Thomas's Hospital, the appearances of a dislocation backwards existed. The patient died upon the fourth day after the receipt of the injury; and on examination after death,

an extensive fracture of the innominatum was discovered, passing through the acetabulum and dividing it into three parts; the head of the os femoris was deeply sunk into the cavity of the pelvis.

Case.

The third case in which the acetabulum escaped was brought into Guy's Hospital in the year 1817, August the 8th. Mary Griffiths, aged thirty, had her pelvis caught between a cart wheel and a post;—when admitted into the hospital, she was pale, feeble, and her fæces passed off involuntarily. On grasping the right os innominatum a distinct motion and crepitus could be perceived, and the posterior superior spinous process projected much above its natural situation. The pubes appeared driven in towards the cavity of the pelvis. An extensive ecchymosis existed upon the right side below the last rib. The pelvis was fixed by a broad bandage, and some opium was administered. She lived until the evening of the 24th, and appeared to sink from the effects of a large slough, which formed over the seat of extravasation upon the right side.

Examination.

The body was inspected the next day, when an extensive fracture was found extending through the body of the pubes and the ramus of the ischium on the left side; the right ilium was separated from the sacrum at.

the sacro iliac symphysis, with a portion of the transverse processes of the sacrum which were torn from the sacrum with the ligaments; the left sacro iliac junction had also given way, but only to a sufficient extent to admit the narrow extremity of the handle of the scalpel between the bones.

I have known several cases of simple fracture of the innominatum recover.

Of Fractures at the upper part of the Thigh Bone.

These injuries have been frequently mistaken for dislocations of the hip, and the distinguishing marks are sometimes with difficulty detected.

Mistaken
for dislocation.

Three species of fracture differing in their nature and result, and requiring distinct modes of treatment, are met with at the upper part of the femur, and have been generally classed under the indiscriminate appellation of fracture of the cervix femoris. Want of proper anatomical investigation by dissection, has given rise to this confused classification, and has led to the disputes respecting the processes which nature employs to effect a cure. Thus one surgeon declares that they cannot be united, whilst another asserts that the

Three
species of.

cure is as easily performed as in fractures of other bones.

The opinions I am about to offer to you, are the result of extensive observation on the living, who have suffered from these injuries; of numerous examinations of the dead body; and of many experiments which I have performed upon inferior animals.

Of frequent occurrence.

These accidents are of such frequent occurrence, that the wards of our hospitals are seldom without an example of them; whilst scarcely two cases of dislocation happen there in the course of the year, although the buildings contain about nine hundred patients.

The different species of injury are as follow:—

First.—That which takes place through the neck of the bone entirely within the capsular ligament.

Secondly.—A fracture through the neck of the thigh bone at its junction with the trochanter major, external to the capsular ligament.

Thirdly.—Fracture through the trochanter major, beyond the cervix femoris.

Of Fracture of the Neck of the Thigh Bone within the Capsular ligament.

Signs of limb shortened.

The following appearances are usually pro-

duced by this fracture:—the limb becomes shortened one or two inches; this arises from the connection between the head of the bone and the trochanter major being destroyed, so that the latter loses its support and is drawn up by the action of the glutei muscles, as far as the capsular ligament will admit of; and it therefore rests upon the edge of the acetabulum, and a little upon the ilium above it. This difference in length is readily detected by placing the patient in a recumbent posture and comparing the situation of the malleoli; the heel of the injured extremity is usually found resting in the hollow between the internal malleolus and the tendo achillis of the sound limb; but this is not always the case. For a short period after the receipt of the injury, this shortening may be made to disappear by a very slight extension of the limb, but it again reappears immediately that the extension is discontinued. This may be again and again effected, until the muscles acquire a fixed contraction, which cannot be subdued but by very great force.

Another indication of this accident is the eversion of the knee and foot, from the action of the powerful and numerous rotators outwards, which have but very feeble opponents; the obturatores, the gemini, the pyriformis, the quadratus, the gluteus maximus, the

Limb
everted.

pectinalis, and the triceps, all assist in the rotation of the limb outwards; whilst only a part of the gluteus medius, with the minimus and the tensor vaginæ femoris act as antagonist muscles, or rotators inwards. The eversion is by some considered as depending on the weight of the limb, and not upon the muscular contraction; but the resistance afforded by the rotators outwards, when an endeavour is made to turn the limb inwards, sufficiently prove the true cause of the eversion. The inversion is also in some degree prevented by that portion of the neck which remains attached to the trochanter major, and which rests against the ilium.

Principal
marks.

The shortening of the limb, and the eversion of the knee and foot, are the two principal marks which attract the attention of the surgeon.

How pro-
duced.

When the femur is dislocated upwards, eversion of the knee and foot is prevented by the head and neck of the bone; but the separation of these from the trochanter in the case of fracture, allows of a ready eversion. I have known the limb inverted in a case of fracture of the cervix femoris, but this must be regarded as an extremely rare circumstance.

Symptoms
not well
marked at
first.

The nature of this injury is not well marked until some few hours after the receipt of the

injury, as the muscles do not acquire a fixed contraction for some time ; it is from this circumstance that the injury has been mistaken for dislocation, and that the patients, even in the large hospitals, have been submitted to useless and painful attempts to reduce the displacement.

After the receipt of this injury, the patient suffers little or no pain whilst at rest in the recumbent posture, but rotation of the limb, more particularly inwards, creates much suffering from the fractured end of the bone rubbing upon the synovial membrane, which lines the capsular ligament. The pain is most acutely felt at the upper and inner part of the thigh, near the insertion of the psoas and iliacus internus muscles, into the trochanter minor.

Degree of suffering.

The limb can be moved in all directions, but the flexion creates pain, and is accomplished with difficulty, particularly if the thigh be directed towards the pubes ; if the knee be carried outwards when the thigh is flexed it is accomplished with more ease, and without producing much pain.

The trochanter major of the injured side projects less than that of the sound side, as it has lost the support of the neck ; it is also drawn up towards the ilium, and is therefore higher than that of the perfect limb.

Trochanter major projects less.

Patient
examined
erect.

To be perfectly satisfied of the nature of the injury, the patient should be examined in the erect as well as in the recumbent posture; he should be made to stand, which he can do with assistance, and endeavour to bear his weight upon the sound extremity when the shortening of the injured limb is distinctly seen, the knee and foot are everted, and the prominence of the hip is lessened.

Pain on
standing.

In attempting to rest upon the unsound limb, the patient experiences great pain in consequence of the stretching of the psoas, iliacus internus and obturator externus muscles, as well as by the pressure of the fractured portion of the cervix upon the capsular ligament.

Crepitus.

The fracture is not indicated by a crepitus on motion whilst the patient is recumbent, as in other fractures, but it can generally be felt, when the limb is extended to the original length and then rotated; the crepitus may sometimes be discovered on the mere elongation of the extremity, but it is most distinct if it be turned inwards.

Most fre-
quent in
females.

Females are more liable to this accident than males, which may be accounted for by the powers of the constitution being generally weaker, and the natural position of the neck of the thigh bone more horizontal.

In old age.

The period of life at which this injury occurs, is another circumstance worthy of con-

sideration, as it seldom takes place but at an advanced period of life. We find it described as happening in young persons, but in these cases the injury has not been really confined to the cervix within the capsular ligament, and thus so much confusion has arisen with respect to the true character of the accident. During a period of forty years, for which I have attended St. Thomas's and Guy's Hospitals, and in my private practice, which has been more than my share, I have seen between two and three hundred cases of fracture of the cervix femoris, within the capsular ligament; yet in very few instances have I known it take place in persons under the age of fifty years. It is most frequently met with between the ages of fifty and eighty, at a time of life when dislocation very rarely takes place. I have, however, seen a case of the fracture at the age of thirty-eight, and a case of dislocation at sixty-two.

The liability to the different forms of injury at the different periods of life, is owing to the changes which are taking place in the bones as well as in the other structures of the body, according to the balance of the arterial and absorbent systems; during youth the action of the former preponderates, and hence the source of growth; in middle age the two preserve an equilibrium of action, and thus

Reasons
for.

but little alteration occurs; in old age the absorbents exceed in activity the arteries, from which a diminution arises, but this is rather from a disease of power in the arteries than an increase in the absorbents.

disease
Change in
bones.

Thus the increase of the bones takes place in youth, until they acquire that bulk, weight, and compactness which characterises them at the adult period, and which they for some time retain, until they become gradually light and soft in the advanced period of life: even the neck of the thigh bone undergoes a considerable change from an interstitial absorption, by which it becomes shortened, and altered in its angle with the shaft of the bone, the head often sinking beneath the level of the trochanter major, instead of being above it. This alteration gives the idea, upon a superficial inspection, of there having been formerly a fracture which had united.

Period of
change
varies.

The period at which these alterations take place, vary in different individuals, as we find the general appearances do, which indicate old age, and which are as strongly marked in some at sixty, as in others at eighty years of age.

It is from these changes, however, that the nature of injury varies generally at the different periods of life, as from the different states of the bones, that violence which would

produce dislocation in the adult, occasions fracture in the old person ; and when dislocation does occur at an advanced period of life, it is in those persons who have particularly strong constitutions, and in whom the bones have not undergone the changes I have described.

The very slight causes which often occasion fracture of the bones in old persons, is a proof how much this altered state predisposes to such injury. The most frequent cause of the fracture of the neck of the thigh-bone, in London, is a sudden slip from the foot to the carriage pavement ; which, although only a fall of a few inches, yet it is sufficient to produce this serious accident. It is also often occasioned by a slight fall upon the trochanter major ; and I have known it produced by the toe catching in the carpet, or against some projection in the floor, at the time that the body was suddenly turned to one side. It is particularly necessary to recollect the very slight causes which give rise to this injury, and to be on your guard respecting it, otherwise it could hardly be supposed that an accident of so serious a nature could be so easily produced.

Causes very slight.

With respect to the mode in which these fractures of the neck of the thigh bone within the capsular ligament unite, much difference

Opinions on mode of union.

of opinion exists; it is asserted by some surgeons, that these fractures unite like those occurring in the other bones of the body; but from the numerous dissections which I have had an opportunity of performing in these cases, I firmly believe that, as a general rule, the transverse fracture of the cervix within the capsule does not unite by bone; such is the opinion I have delivered in my lectures for these thirty years, and which has been from year to year strengthened by further observations and fresh dissections.

Want of
bony union.

In all the examinations which I have made of these cases, I have seen but one in which a bony union had followed a transverse fracture of the neck of the bone within the capsular ligament. I do not, however, mean to deny the possibility of a bony union, or to maintain that it cannot take place, but it is an exceedingly rare circumstance. Considering the various modes in which a fracture may take place, the degree of violence which may occasion it, and the extent of mischief to the surrounding parts, which may accompany it, it would be presumptuous in any one to maintain the impossibility of a bony junction; the bone may be broken without the fractured ends being separated from each other, or without any laceration of its periosteum, or the reflected ligament

which covers its neck ; and again, the fracture may be in part within, and in part without the capsular ligament ; under this latter circumstance, I well know that an ossific union might be produced ; and I have had the opportunity of seeing more than one.

I shall now point out several circumstances which in my opinion tend to prevent an ossific union after a transverse fracture of the neck of the thigh bone within the capsular ligament.

Causes
preventing
bony union.

In the first place, a want of proper apposition of the fractured extremities of the bone may in many cases have considerable effect in preventing the union by ossific matter, as we find that a proper junction does not take place between the broken portions of bone, in any part of the body, when the extremities are much separated from each other.

Want of
apposition.

In the case of a boy, from whom a portion of the tibia was removed in consequence of its protruding from compound fracture, but in whom the fibula remained uninjured, so that the ends of the divided tibia could not be brought into contact, no bony union took place.

Case.

A case somewhat similar occurred in the Bristol Infirmary, under the care of Mr. Smith. A portion of diseased tibia, between

Case.

two and three inches in length was removed, leaving a space to that extent between the ends of the bone; and six weeks after the operation the boy was able to walk about without much difficulty, and it was supposed the ossific union had taken place; but in consequence of his death from small pox, an opportunity occurred of examining the limb, when the larger part of the former space was found to be occupied by a thin ligamentous substance, without any bony deposit.

Experiments.

This is also confirmed by experiments which I have made on other animals. I took out a portion of the radius of a rabbit measuring seven-eighths of an inch in length, after which the ends of the bone did not unite to each other, but formed connections to the ulna; in a second experiment, I removed a portion of the radius from another rabbit, measuring only one-ninth part of an inch, but with the same result. Also a portion of the os calcis being separated and drawn above its natural situation by the action of the gastrocnemius muscle, only united by ligament.

Motion of the part.

In the fracture of the cervix femoris it is extremely difficult to keep the limb in a proper and steady position, as the most trifling change in position produces some motion of the part from the contraction of

the powerful muscles which pass from the pelvis to the thigh. Were this, however, the only difficulty, it might possibly with much care and attention, be in a great measure obviated.

Even in those cases in which the length of the limb is properly preserved, another circumstance I conceive may operate to prevent the bony union, which is the want of pressure of one portion of bone upon the other, when the capsular ligament remains entire. This arises from the secretion of a large quantity of synovial fluid into the capsule, which distends the ligament, and prevents the proper contact of the broken bones. After the inflammatory process has subsided, and the effusion of ligamentous matter has taken place from the synovial membrane, then this fluid becomes absorbed.

In other fractures where the bones are surrounded by muscles, the broken extremities are kept pressed together by the action of these muscles; but in the fracture taking place through the neck of the thigh bone, the muscles can only act upon one portion, and that in such a way as tends to separate one from the other.

That pressure is essential to the bony union, is proved by the examination of those cases in which the fractured ends of the bone

Want of
continued
pressure.

How pre-
vented.

Pressure
essential.

overlap each other, when a proper ossific deposit is found on that side where they press upon each other ; whilst on the opposite sides, where no pressure exists, scarcely any alteration can be perceived. Again, in those cases where the actions of the muscles separate the fractured ends of a bone, as we frequently find, union does not take place until the surgeon produces the necessary pressure by artificial means ; as by the application of a belt, which buckles tightly round the limb.

Deficiency
of ossific
inflammation.

A third circumstance, however, tends principally to explain the want of bony union ; in these cases, it is the deficiency of ossific inflammation in the head of the bone, when separated from the cervix ; it is then only supported by the vessels passing from the ligamentum teres, which are minute and few in number. In the perfect state, the head and neck of the femur are chiefly supplied with blood by the vessels of the cancelli of the cervix, and by those of the reflected membrane which covers it. If, therefore, in cases of fracture the reflected membrane be torn through, which it generally will be, the chief source of supply to the head of the bone, and that portion of the neck connected with it, is cut off, and there is not sufficient organic power remaining to pro-

duce ossific matter ; thus we find that scarcely any change takes place in the head of the bone, similar to that occurring in other bones when fractured ; there is merely a layer of ligamentous substance thrown out, and covering the surface of the cancellated structure.

On examining these injuries by dissection, Dissection. we usually find the following appearances :— The head of the bone remains in the acetabulum connected by the ligamentum teres. There are upon the head of the bone, very small white spots, covered by the articular cartilage. The cervix is sometimes broken directly transversely, at others with obliquity. The cancellated structure of the broken surface of the head of the bone, and of the cervix, is hollowed by the occasional pressure of the neck, attached to the trochanter, and consequent absorption ; and this surface is sometimes coated partially with a ligamentous deposit. The cancelli are rendered firm and smooth by friction, as we see in other bones which rub upon each other when their articular cartilages are absorbed, giving the surface the appearance of ivory. Portions of the head of the bone are broken off, and these are found either attached by means of ligament, or floating loosely in the joint, covered by a ligamentous matter ; but these pieces

do not act as extraneous bodies, so as to excite inflammation, and thus produce their discharge; not more than those loose portions of bone covered by cartilage, which are found so frequently in the knee, and sometimes in the hip and elbow joints. With respect to the neck of the bone which remains attached to the trochanter major, the most remarkable circumstance is, that it is in a great degree absorbed, but a small portion of it remaining; its surface is yellow, and bearing the character of ivory, if the bones have rubbed against each other. Some ossific deposition I have seen manifested around this small remaining part of the neck of the bone, and upon the trochanter major, and thigh bone below it, in some examples of this fracture.

Capsular
ligament
thickened.

The capsular ligament, enclosing the head and neck of the bone, becomes much thicker than natural; but the synovial membrane undergoes the greatest change from inflammation, being very much thickened, not only upon the capsular ligament, but also upon the reflected portion of that ligament upon the neck of the bone, as far as the edge of the fracture.

Increase
of synovia.

Within the articulation, a large quantity of serous synovia is found; by which term I mean to express, that the synovia is less

mucilaginous, and contains more serum than usual; this fluid by distending the ligament, separates for a time one portion of bone from the other; it is produced by the inflammatory process, and becomes absorbed when the irritation in the part subsides. I do not know the exact period at which this change takes place, but I have seen it in the recent state of the injury. Into this fluid is poured a quantity of ligamentous matter, by the adhesive inflammation excited in the synovial membrane, and flakes of it are found proceeding from its internal surface, uniting it to the edge of the head of the bone. Thus the cavity of the joint becomes distended, in part by an increased secretion of synovia, and in part by the solid effusion which the adhesive inflammation produces; the membrane reflected on the cervix femoris is sometimes separated from the fractured portions, so as to form a band from the fractured edge of the cervix to that of the head of the bone; bands also of ligamentous matter pass from the cancellated structure of the cervix to that of the head of the bone, serving to unite, by this flexible material, the one broken portion of bone with the other.

The trochanter is drawn up more or less in different accidents; and in those cases in which it has been very much elevated, I have

Ossific deposit on the body of the bone.

known a considerable ossific deposit take place upon the body of the thigh bone, between the trochanter major and the trochanter minor. When the bone has been macerated, its head is much lighter and more spongy than in the healthy state, excepting on those parts most exposed to friction, where it is rendered smooth by the attrition, which gives it a polished surface.

In most cases no ossific union.

It may, therefore, be considered as a general principle, that ossific union is not produced in these cases; nature makes some efforts to effect it on that portion of the fracture attached to the body of the bone, but scarcely any upon the head and portion of the cervix separated with it.

Not only in the hip joint.

This want of ossific union does not appear to be merely confined to the fracture of the cervix femoris, but also occurs in the fractures of the condyles, of the os humeri and coronoid process of the ulna, and other articular processes, when broken off entirely within the capsular ligament.

These opinions, which I have for many years delivered in my lectures, have been confirmed by many cases in which I have had an opportunity of dissecting the injured joint, and also by the result of the experiments which I have performed on other animals, and in which I found only a ligamentous

union occur when the fracture was confined to within the capsular ligament.

The cases of fracture of the cervix femoris may be confounded with those dislocations of the hip in which the limb is shortened; viz. those occurring on the dorsum ilii, the ischiatic notch, and on the pubes; the eversion of the knee and foot, with the greater mobility of the limb will distinguish them from the two former; and in the latter instance, the readiness with which the head of the bone can be felt in the groin, renders the case sufficiently obvious.

Confounded with dislocations.

They may be also confounded with the cases of fracture external to the capsular ligament; but if the surgeon be sufficiently attentive to the following points, he will readily distinguish the difference:—the age of the patient, the length of the limb, the cause of the injury, the feeling of crepitus, the great extravasation of blood, and the degree of suffering; for the fracture of the cervix, generally occurs at an advanced age; the limb is shortened, the cause of the injury very slight, there is not any perception of crepitus until the limb be elongated, and the degree of suffering is very trivial.

With other fractures.

In the treatment of the fractures of the neck of the thigh bone, within the capsular

Various modes of treatment.

ligament, I have tried numerous and various means, to endeavour to effect a bony union, and I have known other surgeons adopt many ingenious plans with the same view, but all without success.

The double inclined plane has been employed with numerous contrivances to keep the injured limb extended, and to support the fractured portions in contact, also to prevent as much as possible, the motions of the pelvis. The straight position, with various modifications, has likewise been employed; indeed, I scarcely know any form of mechanical treatment which could be adopted, which has not been tried, for the purpose of aiding the bony union in these cases. I have not, however, yet witnessed one single example of such a union, which was not doubtful, as to its being entirely within the ligament.

Case. In a convict at Sheerness, who could be completely controlled, the limb was kept steadily extended for six months, yet it united only by ligament.

I am aware that instances of success have been published; but I cannot give credence to such cases, until I see that the authors are aware of the distinction between fractures within, and those without the capsular liga-

ment; and that they are likewise acquainted with those changes in the head and neck of the bone, which occur in advanced age.

Not having found or known any mode of treatment succeed in effecting an ossific union in these cases, and having repeatedly seen the patient's health much injured by the trials which have been made, all that I now direct to be done, is, that a pillow should be placed under the limb for its whole length, and a second rolled up, put under the knee, and that the limb should be allowed to remain upon these for ten days or a fortnight, until pain and inflammation have subsided; the patient should then be allowed to rise and sit in a high chair, to prevent much flexion of the limb, which would be painful. In a few days more he should begin to walk with crutches, and after a time a stick should be substituted for the crutches, and in a few months he will be able to use the limb without any adventitious support; when he commences to bear the weight of the body on the limb, he should be provided with a high heeled shoe, which will much assist him.

Treatment
recom-
mended.

The period and degree of recovery in these cases, depend much upon the bulk of the patient; as the very corpulent patient will, for a long time, require the aid of crutches, in others less bulky, a stick only will be re-

Degree of
recovery.

quired; and in very spare persons such assistance is only necessary for a very short period; but unless a shoe be worn having a sole sufficiently thick to remedy the diminished length of the limb, the patient has a considerable degree of lameness.

In doubtful cases.

Should any doubt exist as to the fracture being situated external or internal to the capsular ligament, the case should be treated as for the former injury, which I shall presently describe, and in which ossific union may be procured.

A cautious opinion necessary.

The surgeon should be very cautious in the opinion he gives respecting the result of these injuries, as when the fracture is transverse, lameness is certain to follow; but in various degrees, which cannot at first be estimated.

Sometimes fatal.

In very aged and infirm persons, this accident sometimes produces fatal consequences, from the exhausted state of the constitution, and from the confinement in the attempts at union.

Of Fractures of the Cervix Femoris, external to the Capsular Ligament.

Difficult to distinguish.

The symptoms produced by this injury, are, in many points, so similar to those

accompanying the former injury, that great attention is necessary to distinguish them. Such a distinction, is, however, highly important, as the result differs so materially, an ossific union being readily produced when the injury is external to the capsular ligament; whereas, in that which I have already described, such a union rarely, if ever, takes place.

When the fracture occurs external to the ligament, the injured limb is but little shorter than the other; the foot and knee are everted, the rotundity of the hip is lost, and the patient experiences much pain at the hip, and about the upper and inner part of the thigh. Signs of.

These marks are also found when the fracture takes place internal to the capsular ligament.

The following are the principle signs by which the nature of these injuries may be detected:—1st. The fracture external to the capsule occurs frequently at an earlier period of life than that which takes place internal to the joint; although I have known it produced after fifty years of age, yet it is usually found under that age. 2nd. The injury is generally occasioned by much greater violence, as by severe blows or falls, or the passage of laden carriages over the pelvis, whereas the internal fracture is the consequence usually of very Distinguish-
ing signs of.

slight cause. 3rd. The crepitus in the fracture external to the ligament, is readily felt when the limb is slightly moved, and generally without drawing it down. 4th. The degree of suffering is much greater, especially on moving the limb, if the injury be external to the capsule, as the rough extremity of the bone penetrates the surrounding muscles; the limb also is much more swollen, and the constitutional irritation is considerable. 5th. There is great extravasation of blood, generally, in these cases.

Dissection
of.

In dissecting these cases, the fracture is generally found at the root of the neck of the bone, external to the capsular ligament; but its seat and extent varies very much in different examples, and the degree of shortening of the limb, depends upon the form of the fracture, and upon the extent of laceration of the surrounding soft parts, so as to admit of retraction.

Complicated.

Sometimes the fracture external to the capsular ligament, is complicated with injury of the trochanters.

Case.

Mr. Travers has an excellent specimen of this form of injury taken from a patient who was under his care in St. Thomas's Hospital.

Richard Norton, aged sixty, was admitted into the Hospital on the 24th of January, 1818, in consequence of severe injury of his

left hip, occasioned by a fall upon the curb stone of the foot pavement. The limb of the injured side was shortened, and the knee and foot everted; the swelling about the hip was very great; the limb could be moved freely in all directions, but not without creating much suffering; and when moved a crepitus could be distinctly felt in the situation of the trochanter major. When the swelling had in great measure subsided, the limb was confined by the application of the long outer splint, and two thigh splints well bedded. In March the splints were removed, when the limb was found to be a little shortened, but the hip had regained its natural appearance. About a month after this, he began to use his limb, walking with the aid of crutches. He was afterwards placed under the care of the physician, on account of his general health being defective, and he died suddenly, being seized with spasms in his chest.

On examining the hip after his death, the fracture was found to have extended through the trochanter, some way down the bone, and it had apparently united with very slight deformity, but on macerating the bone, the head and neck became loose on the body of the femur, they could not, however, be perfectly separated, as a shell of

Dissection.

bone had formed, confining the head and cervix.

The preparation which Mr. Travers was so kind as to send me, presents the following appearances: the head and cervix of the bone had been separated from the trochanter major and body of the femur. The upper part of the bone had been obliquely split, so as to receive the cervix into its cancelli. This fracture had divided the posterior portion of the trochanter major from the body of the thigh bone, and the trochanter minor had been removed with it. Union had taken place between the fractured portions of the trochanter, at a slight distance from each other, and thus a hollow was left into which the cervix femoris was received, but it had not been united by ossific deposit, as it became loose from the maceration.

Mr. Old-
now's
cases.

Mr. Oldnow of Nottingham sent me two specimens of this fracture, in which the necks of the bones were fractured at their junctions with the trochanter major. The trochanter major itself had been broken off, and the trochanter minor formed a distinct fracture. The bones had become re-united, the cervix femoris to the shaft of the bone, and the trochanter minor a little higher than its natural attachment. The trochanter major

was in one specimen re-united to the body of the bone, but not in the other. Thus the thigh bone was at its upper part divided into four parts; the head and neck of the bone formed one part; the trochanter major a second; the trochanter minor a third, and the body of the bone the fourth.

Thus this fracture unites by bone in a similar manner to the fracture of other bones external to the capsular ligaments, because the bones can be brought into apposition, and are confined together by the surrounding muscles, and the nutrition of each extremity of the bone is well supported by the vessels which proceed to it from the surrounding parts.

This in some measure explains the difference of opinion respecting the union of the fracture of the neck of the thigh bone. In the internal fracture, the bones are not applied to each other, and the nutrition of the head of the bone being imperfect, no ossific deposit is produced; but in the external injury, the bones are held together by the pressure of the surrounding soft parts, and are easily kept in apposition by external bandages and splints. Generally a long period is required to produce a perfect union in these cases, and many months elapse before the patient acquires a free use of the limb.

Difference
of opinion
accounted
for.

Case tedious.

Fracture through the Trochanter Major.

Nature of. An oblique fracture sometimes occurs through the trochanter major, without any injury to the cervix of the thigh bone. This accident takes place at all periods of life, and its symptoms are as follow.

Signs of. The limb is but little shortened, and sometimes its length is not altered; the foot is generally benumbed; the patient cannot turn himself in bed without assistance, and any attempt to do so creates excessive pain. The portion of the trochanter connected to the shaft of the bone, is either drawn forwards towards the ilium, or it falls towards the tuberosity of the ischium, being, in general, widely separated from the superior portion; or that which remains connected to the neck of the bone. The foot is greatly everted, and the patient is unable to sit on account of the violent pain produced by the position. From the separation of the fractured extremities of the bone, crepitus cannot often be detected, unless the limb be very freely moved.

**Most important
signs.**

The eversion of the foot, and the altered position of the trochanter major, are the chief distinguishing marks of the injury.

Ossific union readily takes place in these cases, more quickly than in the fracture through the cervix femoris, and the patient recovers a very good use of the limb. Unite by bone.

The first case which I recollect seeing of this injury, was about the year 1786, in St. Thomas's Hospital, under the care of Mr. Cline. Case. The limb was extended over a pillow, rolled under the knee, and splints were applied on each side of the limb; a firm union took place, and the man was able to walk extremely well. After being dismissed from the hospital, he was attacked with fever, of which he died. On examining the seat of injury after death, the fracture which had extended through the trochanter major, was found firmly united with very little deformity.

The following are the particulars of a case which I attended with Mr. Harris, of Reading.

July 20th; 1821, Mr. B., aged 51, a gentleman residing about six miles from Reading, fell from his horse, and injured his left hip; he got up immediately, and walked a few steps, but soon found that he was incapable of bringing his left leg forward, and he felt a severe pain in the hip. He was conveyed home in a cart, a distance of about four miles, and Mr. Harris visited him about Case.

two hours after the accident, when the following circumstances were noticed. He could not discover any crepitus on rotating the limb; it was of equal length with the sound one; the foot was not turned inwards or outwards, and the patient could retain it in any position in which it was placed. A good deal of swelling existed about the hip, and Mr. B. complained of some pain; he could bear the limb to be moved without much increase of suffering, excepting when the injured limb was drawn across the sound one, when the pain was greatly augmented. Under these circumstances, Mr. Harris gave it as his opinion, that there was not either a fracture or a dislocation.

On the 22nd, Mr. Ring, of Reading, saw Mr. B. and on examining the limb, confirmed the opinion of Mr. Harris.

The patient was kept at rest, and leeches, with evaporating lotions, were employed to reduce the swelling of the hip.

On the 26th, an acute attack of hepatitis, rendered active treatment necessary; and during this time, the limb remained much in the same state.

August 14. Mr. Ring again examined the limb, and whilst moving it, thought he felt a crepitus. On the following day, Mr. Harris also felt and heard the crepitus.

The case being, however, still obscure, Mr. Brodie was sent for; on his arrival, the particulars of the case were communicated to him, and he minutely examined the injured limb, but for some time was doubtful as to there being a fracture, until, upon rotating the limb very extensively, he distinctly felt the crepitus; he was, however, much surprised to see, that the patient could, when standing, bear very considerably upon the injured limb, and he considered the case as very obscure, the usual symptoms of fracture, except the inability to move the limb, being but little marked or entirely wanting.

Mr. Brodie applied a long splint, with a bandage from the toes to the hip, which he directed to be worn for a month; and at the same time, ordered the limb to be kept perfectly at rest.

But little alteration having taken place in the case at the end of the month, Sir Astley Cooper was requested to visit Mr. B. After hearing the history of the case, he proceeded to examine the limb. First, looking to the relative position of the extremities, as the patient lay upon his back, he placed his hand under the trochanter major, which he found had dropped from its natural situation, and raising it toward the cervix, he readily detected the crepitus,

and agreed with Mr. Brodie, and Mr. Harris, as to the nature of the injury, viz. a fracture of the cervix femoris, where it unites with the trochanter major.

The following plan of treatment was adopted by Sir Astley, with a view of retaining the trochanter in its proper position, whilst the patient could remain perfectly at rest in the horizontal posture.

A mattress was made of horse hair, about five inches thick, very smooth, and this was covered with a sheet. A part of the mattress was made to draw out on the opposite side to the fracture, so that when the natural evacuations took place, there still should be no motion of the body; before drawing out the piece of mattress, a board of two feet long, and six inches wide, shaped like a wedge, was insinuated under the buttock of the right side, the two ends of the board resting on the mattress, thereby preventing the nates from sinking, at all, into the opening, when the piece of mattress was removed, the board was of course taken away, when the portion of the mattress was replaced. Upon the bedstead, was first placed a thick smooth board, sufficiently large to cover the bottom of the bed, and on that was placed the mattress, thereby preventing any sinking by the weight of the body.

A bandage, made in the following manner, was applied to support the trochanter:—a broad web, sufficient to go round the body, over the hip, was furnished with two straps and buckles to fix it with, and the belt was made of a greater width at that part, which was to be placed under the injured trochanter; the whole was lined with chamois leather, and stuffed; a pad of the same leather was made, about six inches long, three broad, and three thick, gradually tapering to a point; this pad was placed immediately under the injured trochanter, so that when the bandage was buckled on, it passed into the hollow beneath that process, forcing it upwards and forwards into its natural position. Another thick pad, about eight inches square, of a wedged shape, was provided, and this was placed under the upper part of the thigh of the injured side, after the application of the bandage.

The patient was placed on his back, the limb resting on the heel; and to prevent the possibility of any motion of the foot, and of the body, a wide board was fixed to the bed posts, at the foot of the bed, with two pieces of wood padded and fastened to it, between these the foot was received, and the least lateral motion prevented. A cushion was placed between the

foot board, and the sole of the sound foot, so that by gentle pressure, the patient could prevent his body from slipping down in the bed.

This mode of treatment was steadily pursued for a month, without much inconvenience or suffering to the patient; the bandage being from time to time tightened. Until the expiration of three weeks, the patient said he could occasionally still feel the crepitus, but after that period, this sensation entirely disappeared; he complained of some pain in the direction of the trochanter, and the limb became somewhat œdematous.

Sir Astley Cooper again visited Mr. B. a little more than a month from his first seeing him, when he was of opinion that union had begun, and directed a continuance of the same treatment, which was therefore persevered with for a further period of about ten weeks; Sir Astley seeing the patient once in this time.

It was not until fourteen or fifteen weeks from the commencement of this treatment, that the bandage was removed for more than a few minutes, or that any material alteration was made in the plan. It was then taken off for about two hours; when the trochanter was found to retain its posi-

tion, and from examination of the parts, a considerable thickening could be discovered about the trochanter.

After this, Sir Astley desired that the bandage should be re-applied every day for an hour, and directed friction to the limb from the foot upwards. Mr. B. from this time, rose every day, and was soon able, when supported by his crutches, to move his hip joint freely; but the limb continued much swollen, and the motions of the knee joint were extremely limited. By steadily persevering with friction, and passive motion, Mr. B. has since obtained a free use of the extremity.

A peculiar form of fracture of the trochanter major, in which this process was separated at the part at which it is naturally united by cartilage as an epiphysis, occurred under the care of Mr. Key.

Fracture of
trochanter.

The patient, a girl about sixteen years of age, fell in crossing the street, and struck her hip against the curb-stone. She rose directly, and walked home without much suffering or difficulty, but experiencing afterwards considerable pain, she was taken to Guy's Hospital on the sixth day after the accident. On account of her constitutional symptoms being much more severe than those usually attending injury to the hip, she was placed under the

Case.

care of Dr. Bright, at whose request Mr. Key examined the limb, which he found considerably everted, and in appearance about half an inch longer than the sound extremity; it could be moved in all directions, but abduction caused great pain; not any crepitus or displacement could be discovered, and her having walked both before and after her admission into the hospital, gave rise to a supposition that fracture did not exist. Her constitutional suffering rapidly increased, accompanied with general uneasiness about the abdomen, and she died on the ninth day from the receipt of the injury.

After death, Mr. Key first examined the seat of injury externally, with attention, but could not discover any deviation from the natural state.

Dissection. On exposing the capsule of the joint afterwards, a cavity was discovered by the side of the pectineus muscle, passing backwards and downwards towards the trochanter minor, and containing some pus: it extended behind the bone to the large trochanter. On cutting through the ligaments, and dislocating the head of the bone, a fracture was first perceived at the root of the trochanter major. This fracture had separated the trochanter from the neck and body of

the bone, without the tendons attached to the outer side of the process having been injured, so that a separation of the fractured portions could not take place, on which account the nature of the accident had not been detected during the life of the patient.

Of Fractures below the Trochanter.

When the thigh bone is broken just below the trochanter major and minor, much difficulty exists in effecting a good union, and if the treatment be ill-managed, great deformity is the consequence. The fractured extremity of the superior portion of the bone is drawn upwards and forwards by the action of the psoas, iliacus internus, and pectineus muscles, and any attempts by pressure to obviate this position of the bone, only increases the suffering of the patient, without effecting the desired purpose.

Difficult to manage.

In the treatment of such a case, two principal circumstances require attention: first, to elevate the knee, by placing the limb over a double inclined plane, and secondly, to raise the body so as to place the patient in nearly a sitting position; the degree of elevation of the limb or of the body must depend on the approximation of the fractured

Treatment.

ends of the bone, and the surgeon must carefully ascertain that the proper relative position of each portion of the femur is restored, before he proceeds to apply the splints and bandages to retain them in this state. A strong leather belt lined with some soft material, and made to buckle round the limb, answers better in these cases, than the common splints.

Specimen
of.

A preparation in the museum at St. Thomas's Hospital exhibits the mode of union in an ill-treated case of this kind, and illustrates the necessity of careful attention to the points I have mentioned, viz. : the relaxation of the psoas, iliacus internus, &c. by elevating the body, and the raising of the inferior portion of bone to a line with the superior.

LECTURE XLIV.

Of Dislocations of the Knee.

The frequent and great violence to which this joint is exposed, also the form of the articulation, the cavities on the head of the tibia being very shallow, would render it extremely liable to displacement, were it not for the extent of articulating surface, and the existence of numerous strong ligaments, which connect the os femoris, the tibia, and the patella.

Structure
of joint.

Dislocations do, however, sometimes occur from excessive violence, or from great relaxation of the connecting ligaments.

Of Dislocation of the Patella.

The patella may be dislocated in three directions;—viz. outwards, inwards, and upwards.

Three
forms of.

The external displacement is the most common; in which case the patella is thrown upon the outer condyle of the os femoris, where it occasions a great projection, which

External.

circumstance, and the incapacity of bending the knee joint, sufficiently mark the nature of the injury.

Cause of. Persons who have naturally an inclination of the knee inwards, are most liable to this injury, and it is usually produced by a fall at the time that the knee is turned inwards and the foot outwards, so that the action of the muscles, in endeavouring to prevent the fall, draw the patella over the external condyle of the thigh bone.

Internal. The displacement of the patella upon the internal condyle, is much less frequent, and generally happens from a fall upon a projecting body, by which the patella is struck upon the outer side, and forced inwards at the time that the foot is turned in the same direction.

Ligament torn. Unless the ligament has been relaxed from previous disease, it will be torn in either of these dislocations.

The reduction, in either case, may be accomplished in the following manner:—

Treatment. Place the patient in the recumbent posture, and let the leg be raised, by lifting it at the heel, so that the extensor muscles of the thigh may be relaxed as much as possible; then press down firmly the edge of the patella, furthest from the articulation, by which the opposite edge will be raised

over the condyle, when the action of the muscles will quickly restore the bone to its natural situation.

The following plan was adopted by Mr. Case. George Young, in a case of the external dislocation, which he could not succeed in reducing by other means. He placed the ankle of the limb upon his shoulder, which gave him considerable power in extending the knee joint, when grasping the patella with the fingers of his right hand, he pressed the outer edge of the bone with the ball of his left thumb, and thus forced it into its place.

After the reduction, the limb must be kept at rest, and the part kept moist with an evaporating lotion; after three or four days, bandages may be employed. The motions of the joint are soon restored, but a degree of weakness remains for some time. After treatment.

Very slight causes produce the lateral dislocation, when much relaxation exists, but the reduction is very easily accomplished, and it is necessary to employ a laced knee cap, with a strap and buckle above and below the patella, to prevent a recurrence of the accident. From relaxation.

Of the Dislocation of the Patella upwards.

- Nature of.** In this displacement, the ligamentum patellæ is torn through, and the patella is drawn upwards upon the fore part of the thigh bone.
- Signs of.** The nature of this injury is extremely well marked, by the elevation of the patella, the freedom of its motion laterally, and the depression above the tubercle of the tibia from laceration of the ligament: the patient cannot support himself upon the limb, as the knee immediately bends when he attempts to do so. The accident gives rise to a considerable degree of inflammation.
- Treatment.** The treatment required for this injury, in the first place, will be to reduce the inflammation, by the application of leeches and evaporating lotions, at the same time that the limb is kept extended, and the body elevated, to relax the muscles, and prevent as much as possible the elevation of the patella; after from four to seven days, a roller should be placed upon the limb, from the toes to the knee, to prevent swelling, and a splint should be fixed behind the knee, to prevent any motion of the joint; a leather strap should then be buckled around the lower part of the thigh, just above the patella, and

to this should be attached another strap, which should pass on each side of the leg, under the foot, by which the circular strap may be drawn down so as to restore the patella as near as possible to its natural position, and thus approximate the lacerated ends of the ligament, to allow of union.

With great attention, the union will be perfect; passive motion may be carefully employed at the expiration of a month.

With attention,
union
perfect.

The degree of recovery depends upon the length of the ligamentous union, being perfect when the lacerated extremities are kept in contact during the union, and the powers of the limb being diminished in proportion to their separation.

Degree of
recovery.

A dislocation of the patella downwards has been mentioned by some surgeons, but I have not seen any injury deserving such a title. Sometimes the tendon of the rectus muscle is torn through, in which case a depression can be felt above the patella, but the bone itself retains its natural situation. The same position of limb and body is necessary in the treatment of this injury, as in the dislocation upwards, and a pad should be applied over the ligamentum patella, and confined there by a roller.*

Dislocation
downwards.

* In a case of this nature which came under my

Of Dislocation of the Tibia at the Knee Joint.

Four
forms of.

The superior extremity of the tibia may be displaced in four directions, viz.: outwards, inwards, backwards, and forwards, but only the two latter are complete dislocations, as in the two former instances the articular surfaces of the tibia, and of the condyles of the os femoris are still partly in contact.

These lateral dislocations occur but seldom.

Inwards.

When dislocated inwards, the head of the tibia forms a large projection on the inner side of the joint, the internal condyle of the femur rests upon the external semilunar cartilage, and the external condyle projects to the outer side.

Case.

The first case of this injury which I recollect seeing, was brought into St. Thomas's Hospital, during my apprenticeship there, when I remember being struck with three

care in St. Thomas's Hospital, I found considerable advantage from the application of a pad over the upper portion of the rectus muscle, it was confined by a roller, and assisted materially in approximating the lacerated ends of the tendon; the patient recovered with perfect use of the limb.—T.

circumstances respecting it; first, the great deformity of the joint—second, the little force necessary to reduce the displacement—third, the slight degree of local or constitutional suffering which followed, the recovery being complete in a few weeks.

When displaced outwards, the tibia projects upon the outer part of the joint, the internal condyle upon the inner side, and the external condyle rests upon the internal semilunar cartilage, the deformity produced being as great as in the former case. Outwards.

The reduction in either instance may be readily effected by direct extension, and but little diminution of power in the joint follows. I believe that, in both these dislocations, the tibia is rather twisted upon the femur, than forced merely inwards or outwards, so that the condyle of the os femoris is thrown somewhat backwards with respect to the head of the tibia, as well as laterally. Reduction.

When the patient is first allowed to use the limb after an accident of this kind, the joint should be supported by a bandage or a knee cap, as from the injury to the ligaments, it remains feeble for some time, although the recovery ultimately is nearly perfect. After treatment.

Dislocation of the Tibia forwards.

Signs of. When this accident occurs, the following appearances will be presented, when the patient is in the recumbent position. The head of the tibia projects forwards, and the inferior part of the thigh bone is depressed, being thrown a little to one side as well as backwards: the patella is drawn up by the action of the rectus muscle. The circulation through the popliteal vessels is obstructed by the pressure of femur posteriorly, so that arteries below cease to pulsate, and the foot feels numbed from pressure upon the nerves.

Case. A man named Briggs was admitted into Guy's Hospital, in the year 1802, under the care of Mr. Lucas. He had a dislocation of the tibia forwards, in one extremity, which presented the marks I have described, and a compound fracture of the tibia, with a dislocation of the head of the fibula existed in the opposite limb. The extent of mischief attending the compound fracture, rendered it necessary to amputate that extremity. The dislocation in the other extremity was easily reduced, by extending the thigh from above the knee, and by drawing the leg from the thigh, inclining the

tibia a little downwards. The patient recovered.

Dislocation of the Tibia backwards.

This injury occasions the following marks. Signs of.
A projection of the condyles of the os femoris anteriorly, a depression of the ligamentum patellæ, the head of the tibia is seated behind the condyles, and the limb is shortened, the leg being bent forwards. My friend, Dr. Walsham, sent me the following particulars of a case which was under his care.

Mr. Luland, a very robust and muscular Case.
man, had his shoulder and knee dislocated in consequence of being thrown from his cart, in January, 1794. The head of the tibia was completely dislocated backwards, reaching behind the condyles of the femur into the ham; the tendinous connexion of the patella to the rectus muscle was ruptured; the external condyle of the os femoris was very protuberant; the leg was bent forward and shortened, and there was a depression just above the patella. The patient felt most excruciating pain when the limb was moved, but there was not any considerable suffering when it was at rest.

It was reduced by the following means:— Two men extended upwards, one from the groin, another from the axilla, whilst two others extended the leg from a little above the ankle, in the opposite direction; and they gradually increased the force of their extension, till the bone was reduced. At the time of extension, Dr. Walsham directed the head of the bone to its natural situation. A roller was afterwards placed over the knee, the limb was laid upon a pillow, and an evaporating lotion was constantly applied. In this state, the patient remained for a fortnight free from pain, when the Doctor gently moved the joint every other day, as far as he could, without creating pain. In about a month, Mr. Luland began to walk on crutches, in ten weeks he was able to sit at the dinner table, and in five months, had perfectly recovered the use of his limb.

Of Partial Luxation of the Thigh Bone from the Semilunar Cartilages.

Reason of. The ligaments of the knee joint sometimes become so much lengthened from extreme relaxation, or from an increased secretion into the joint, as to permit the

semilunar cartilages to glide upon the surface of the tibia, when pressure is made by the femur on the edge of the cartilage.

The nature of the 'accident was first accurately described by Mr. Hey, of Leeds, who was so justly celebrated from his high professional attainments; he also suggested an ingenious and scientific mode of treatment, which is generally successful.

First described by
Mr. Hey.

The displacement is most frequently occasioned by a person when walking, catching the toe against some projecting body, whilst the foot is everted, pain is immediately felt in the joint, and the limb cannot be straightened. I have known it also produced by the bed clothes, obstructing the motion of the foot, when a person has been turning in bed. The explanation of the accident is as follows:—

Causes of.

The semilunar cartilages, which receive the condyles of the femur, are united to the tibia by ligaments; and when these ligaments become extremely relaxed or elongated, the cartilages are easily pushed from their situation by the condyles, which are thus placed in contact with the head of the tibia, and when an attempt is made to extend the limb, the edges of the semilunar cartilages prevent it.

Explanation of.

The mode of reduction is, to bend the

Reduction.

limb as much as possible, so as to enable the cartilage to slip into its natural position from the pressure of the femur : the cartilage being thus replaced, the limb can be again properly extended, and the condyles are again received upon the cartilage.

I have, however, known this plan to fail in effecting the desired object, as the following case will show.

Case. A lieutenant in the army, who had been repeatedly the subject of this injury, and who had been as often relieved by the means above recommended, had a recurrence of the accident whilst turning in his bed ; he came to town, but the former mode of treatment, although repeatedly tried, did not succeed in reducing the dislocation ; he afterwards went to Mr. Hey, of Leeds, but without obtaining relief.

After treatment. A knee cap, made to lace closely upon the joint, will generally prevent any further displacement ; but, in some cases, this is not sufficient.

Case. Mr. Henry Doble consulted me, in consequence of his suffering frequently from this accident, which could only be prevented by the addition of straps to the knee cap, one of which, of considerable strength, passed just below the patella.

Case. In another case, that of a young lady,

also frequently the subject of this dislocation, the accident could only be prevented by a linen bandage, having four rollers attached to it, which were tightly bound above and below the patella.

I have seen some cases of this kind, in Effects of. which a very great alteration has taken place in the form and size of the joint, in consequence of a chronic inflammation attending them. The following is an account of one :—

Lady D. in falling, twisted her thigh in- Case. wards, so as to occasion great pain in the knee-joint. On attempting to extend the limb, she could not move the knee-joint ; but, after pressing the thigh outwards, and leg inwards, with some force, she found herself capable of straightening the extremity. For a fortnight after the accident, the joint was extremely weak, and she could hardly bear it to be moved. She then began to stand upon the limb, supporting herself by crutches ; but when she bore much upon the injured limb, it suddenly bent back, and this produced considerable pain and swelling, at the time she felt the condyles slip from the semilunar cartilages upon the head of the tibia. This occurred repeatedly during a period of fifteen months after the accident, and each time greatly retarded her

recovery. Three months after this, she had so far improved, as to be able to walk with the aid of a stick only, when, in endeavouring to raise herself from a sofa, her left knee gave way, as if the bone had slipped from its place; the thigh bone being at the same time twisted outwards; this produced great pain and swelling, and she was again unable to stand upright. Her joints were all remarkably flexible, and when a girl, she often experienced a sensation of having dislocated her knees, but from this she soon recovered. When I saw her, both knees were much enlarged from effusion of synovia into the cavities of the joints, she could not stand without support, and was unable to straighten the limbs. To relieve her, blisters were applied, and for some time kept discharging; after they were allowed to heal, pressure was employed by means of bandages, which were occasionally removed, to allow of friction. She derived most benefit from the internal use of the pilul: hydrarg: submuriat: comp: and the decoct: sarsaparillæ comp: and externally from the friction.

Dissection
of these
joints.

In the dissection of these cases, the ligament is found extremely thickened; small ligamentous and cartilagenous bodies are hanging from it; part of the articular car-

tilage is absorbed, and part presents a thick projecting edge. After maceration, the edges of the condyles are found to be much increased by deposit of bony matter.

Of Compound Dislocations of the Knee.

This accident is of very rare occurrence; Very rare.
I have only once seen such a case, which required immediate amputation; and I scarcely know any form of injury which would so urgently call for operation.

On the 26th of August, 1819, I was sent Case.
for by Mr. Oliver, of Brentford, to see a Mr. Pritt, in consequence of severe injury to the knee, occasioned by a fall from the coach box of one of the mails. On examining the limb, I found a large aperture in the integuments, on the outer side of the knee joint, through which the external condyle of the femur projected, so as to be on a level with the edges of the skin. The inferior part of the os femoris was thrown behind, and to the outer side of the head of the tibia, the bone was twisted outwards, so that the internal condyle was situated upon the head of the tibia, whilst the external condyle was turned backwards and outwards. We succeeded in replacing the bones with much difficulty,

but as soon as the extension ceased, they returned to the same position as I have above described.

In consequence of the great severity of the injury, the difficulty of the retaining the bones in their natural situation, and the patient being of a very irritable disposition, I immediately proposed, and with his consent, performed the operation of amputation. Great constitutional suffering followed the operation, but under the judicious treatment of Mr. Cline, who visited him during my absence from town, he gradually recovered.

Dissection. On dissecting the limb after the operation, I found great extravasation of blood into the cellular tissue surrounding the joint; the vastus internus was extensively lacerated, just above its connexion with the patella; the tibia projected forwards, and the patella was situated to the outer side of the knee. On the posterior part, both the heads of the gastrocnemius externus muscle were torn through, and the capsular ligament so completely divided, as to admit both the condyles of the femur through it.

**Attempt
to save the
limb.**

Should a case of compound dislocation of the knee occur, in which a very small wound only existed, admitting of ready closure, it would be right to attempt the preservation of the limb.

Of Dislocations of the Knee from Ulceration.

From the chronic diseases of joints, not only the synovial membrane and articular cartilages suffer from ulceration, but in some cases the capsular, and also the peculiar ligaments become ulcerated, so that the connexion between the bones is in a great measure destroyed, when the muscles which participate in the irritation, contract and gradually displace the bones producing great distortion of the limb. Cause of.

This is most frequently seen in the hip joint; but it is not uncommon to find at the knee the tibia drawn out of its proper line, with respect to the femur from the same cause.

Occasionally, the distortions thus produced are very remarkable. Mr. Cline amputated a limb in St. Thomas's Hospital, in which the following alteration had taken place from chronic disease in the knee joint. The leg was placed forwards, at right angles with the thigh, so that, prior to the operation, it projected before the patient when he was standing. On examining the joint, the patella was found ankylosed to the femur, as also the tibia to the fore part of the condyles of the thigh bone. Extraordinary distortion. Case.

Mode of
preventing.

Much may be done in the early stage of this disease, to prevent deformity, by the application of splints, and the use of internal remedies, as the pulv: Ipecacuanhæ comp: to diminish general irritability.

Of Fractures of the Knee Joint.

I shall now proceed to describe the fractures which occur in the bones forming the knee joint.

Fractures of the Patella.

Forms of.

The most common fracture of this bone, is transversely; sometimes, however, it is broken longitudinally; these fractures may be either simple or compound, but the latter rarely happens.

Transverse.

When fractured transversely, the superior portion of bone is separated from the inferior being drawn up by the action of the rectus vasti and crureus muscles, which are inserted into it. The lower portion of the bone remains in its natural situation, connected to the ligamentum patellæ.

Extent of
separation.

The degree of separation will be found to vary from half an inch to five inches, and

it depends upon the extent of laceration of the capsular ligament, and tendinous aponeurosis covering it.

The nature of the injury is readily recognised, on examination, by the fingers, when pressed between the two portions of bone, sinking nearly to the condyles of the femur; by the situation of the upper portion of bone, and by its free lateral motion upon the fore and lower part of the thigh bone; the patient cannot extend the limb, nor can he support the weight of the body upon it when standing, as the knee immediately bends forwards from the loss of the support of the extensor muscles. The injury, if simple, is attended with but little pain, and is not productive of much constitutional suffering. Signs of.

A few hours after the receipt of the accident, the part becomes tumid from extravasation of blood, and the surface presents a discoloured appearance from ecchymosis, this, however, subsides in a few days, but the joint enlarges from an increased secretion of synovia, and from effusion in consequence of inflammation. As the portions of the bone are separated, no crepitus can be felt, as is usual in other fractures. Consequent swelling.

Two causes are found to produce this injury:—First, Falls upon the knee, or blows upon the patella, when the patient is Causes.

erect. Second, The action of the extensor muscles upon the bone, in any sudden effort to prevent a fall.

Case. I was called to attend a gentleman, who had fractured his patella by an effort he made to save himself from falling, after having leaped over a broad ditch.

Case. I also saw a lady, who met with the same accident, in endeavouring to save herself from a fall, when descending some stairs, having placed her heel too near to the edge of one of the steps.

Explained. It may appear extraordinary, that the action of the muscles alone is sufficient to produce fracture, but a little attention to the structure and mode of action easily explains the fact. When the knee is bent, the patella is drawn down on the end of the condyles of the femur, and the upper edge of the bone project forwards, so the muscles do not act in a line with the patella, but at right angles with it, and more particularly upon its upper portion.

Mode of union. The union in these cases is generally ligamentous, whether the portions of the fractured bone be nearly approximated, or widely separated. Soon after the accident, blood is poured out, and fills the space between the lacerated ligament and broken pieces of bone, but this soon becomes ab-

sorbed, and its place is occupied by adhesive matter thrown out in consequence of inflammation; this soon becomes organised by vessels from the edges of the injured ligament, and a structure, similar in its character to ligament, is thus produced, by which the parts divided by the injury are again united. Sometimes this new structure does not completely fill up the space formed by the separation of the portions of bone and ligament, but it has apertures in it; but this most frequently occurs when the separation is very great, or when the limb has been moved too soon after the accident.

On examining the seat of injury, some Dissection.
time after the accident, I find that the patella itself undergoes but little change, the inferior portion has its broken surface very little altered, being only rather smoothed; the upper portion has its fractured surface covered with some ossific deposit, so that there is more ossific action in the superior than in the inferior portion of the bone. The articular surface maintains its natural appearance.

By experiments on the rabbit, I have Experiment
been able to trace the mode in which this injury is repaired; in each experiment I divided the patella, by placing a knife on the bone, and striking it gently with a mallet,

having first cut through the integuments, which I drew as much as possible to one side, so that when allowed to resume their natural situation after the division of the patella, the wound was not opposite the fracture.

Appear-
ances for-
ty-eight
hours after

Examining the parts forty-eight hours after the division, I found the portions of bone separated to the extent of three quarters of an inch, and the intervening space filled with coagulated blood.

Eight days
after.

In a second experiment, examined eight days after, most of the blood was absorbed, and adhesive matter deposited in its place.

Fifteen
days after.

A third, examined on the fifteenth day, the adhesive matter had become smooth and somewhat ligamentous.

Twenty-
two days
after.

A fourth, examined on the twenty-second day, the new ligament was perfect.

Five weeks
after.

A fifth examined at the expiration of five weeks, and injected, showed the organisation of the new ligament, which was chiefly supplied by vessels from the original ligament, and by a very few vessels from the bone.

Union by
ligament.

In repeating these experiments upon the rabbit and dog, I could not succeed in producing a bony union, although I could keep the fractured pieces in perfect contact.

Bony
union.

I believe, however, that ossific union may now and then be produced; in a case which

I saw with Mr. Chopart at Paris, there was every appearance of such a junction, and Mr. Fielding of Hull has published another case.

Although in a large majority of these cases, I believe the union to be ligamentous, yet it is extremely desirable to make the ligament as short as possible, as the degree of recovery of the power of the limb is in proportion to the approximation of the fractured portions of the patella, or according to the shortness of the new ligament, for as the superior portion of the bone is separated from the inferior, by the action of the rectus muscle, so the muscle becomes shortened, and its power consequently diminished. When, therefore, the intervening ligament is very long, the person cannot walk fast without a halt, and is in constant danger of falling.

In the treatment of the transverse fracture Treatment. of the patella, the patient should first be placed in bed upon a mattress, with the injured limb extended, behind which a hollow splint, well padded, should be applied; the heel should be elevated a little, and the body raised, in order to relax, as much as possible, the rectus muscle, and thereby prevent it from drawing up the superior portion of the fractured bone. The limb

should be fixed to the splint to prevent its slipping, and the surface of the joint should be kept constantly moist, with an evaporating lotion. If there be much tension or pain succeeding the injury, the application of leeches will be necessary, with a continuance of the evaporating lotion. In a few days, the swelling and pain will subside, under this plan of treatment, after which the bandages may be applied to approximate the portions of bone. The surgeon should be very careful not to apply the bandages before the tension has been reduced; I have known severe suffering and inflammation produced by their too early application, so much so in some cases as to threaten a sloughing of the integuments.

Common
bandage.

The most common mode of using the bandages is as follows: a roller is first applied from the toes to the knee, to prevent swelling of the leg; two pieces of broad tape are then placed on each side of the patella, in the direction of the limb, and two rollers are next bound round the extremity, one above, and the other below the knee joint, confining the pieces of tape, and having the two portions of bone between them; the ends of tape on each side are afterwards turned over the rollers, and tied so as to bring the rollers nearer to each other, and

thus press the portions of the fractured bone as near as possible together; the splint is again applied and fixed to the limb, to prevent any flexion of the joint, the heel is still raised, and the body supported nearly in the sitting posture.

I usually adopt a mode rather different, which I think preferable, and which consists in buckling a leather strap around the lower part of the thigh, immediately above the superior portion of the patella, and having another strap attached to the former on each side, long enough to pass under the sole of the foot, by which the circular strap can be drawn down, and with it that part of the broken bone connected to the tendon of the rectus muscle; the splint and the position are attended to as above-mentioned.

Another mode.

It is necessary in the adult to continue this treatment for five weeks, and in elderly persons for six weeks, before any motion is allowed; it may then be employed passively, but very cautiously, until it be ascertained that the union is sufficiently firm to bear it without risk, when it may be continued from day to day until the joint can be completely flexed.

Period of confinement.

Passive motion is very essential to promote the return of power in the muscles and joint, as without it many months will elapse,

Passive motion essential.

and the patient still be incapable of flexing the limb. When passive motion is to be employed, the patient should be seated upon a high stool or table, in such a manner that the edge of the seat reaches as far as the ham, so that the leg can be depressed without the thigh; this is to be done with considerable care at first, until a slight degree of motion has been acquired, when the patient may, by swinging the leg, and directing his mind to the contraction of the rectus and exterior muscles, gradually restore the functions of the joint. If the union has taken place with a shortened state of the rectus muscle, and the portions of bone are joined by a long intervening ligament, the muscle does not recover its voluntary power until it has been again elongated, which is done by bending the knee.

Case.

A young woman who had suffered from transverse fracture of both patellæ, was brought to my house, in consequence of not having recovered any power of flexing the limbs. Passive motion was employed and she was directed to extend the limbs, when they had been flexed by the surgeon; in this manner, after persevering for some time, she gradually recovered the use of the joints. The pain created by the passive motion, and the very gradual benefit de-

rived from it, make patients averse to its continuance, but it is perfectly essential to recovery.

Of the Perpendicular Fracture of the Patella.

This injury, as the former is attended with considerable effusion and swelling of the soft parts.

Having seen several cases in which the union had only been effected by ligament, and not being aware of any circumstance that should prevent ossific junction, I made several experiments upon dogs and rabbits, the result of which was as follows:—

Having produced fractures in a manner somewhat similar to that already described, for occasioning the transverse division of the bone, sufficient time was allowed for the process of cure to be completed, when the bones were examined, and found to be joined only by ligament, and the two portions considerably separated from each other, from the pressure of the condyles of the femur upon the inner surface of the patella when the knee was bent.

I therefore made another experiment, and divided the patella in a dog, but in such a

Union by
ligament.

Experiment.

manner, that the tendon above, and the ligament below, remained uninjured, so that there could be no separation of the fractured portions; in this case, I found that a perfect ossific union took place.

Union by
bone.

It appears then, that in either, the longitudinal or transverse fractures, when the portions of bone are separated, that a ligamentous union takes place; but if these portions remain in contact, that they may be united by bone.

Case.

Mr. Marryat had his patella broken into three portions, by a fall from his gig, the bone was divided by a transverse fracture, and the lower piece again divided by a perpendicular fracture; the transverse fracture united by ligament only, whilst the perpendicular fracture joined by bone.

Experiment.

I fractured the patella of a dog, separating it into four portions by a crucial division, no union took place between the two superior pieces, neither to each other, nor to the inferior, but the inferior portions became united to each other by bone.

Treatment.

The treatment of this accident, consists in placing the limb in an extended position, with a padded splint posteriorly, to prevent any motion of the knee joint; in applying an evaporating lotion until the swelling and pain have subsided, after which, a knee-cap

padded on each side of the patella should be buckled around the joint, the straps passing above and below the patella.

Of Compound Fracture of the Patella.

When this accident is attended with extensive laceration, and much contusion of the surrounding soft parts, it will be right immediately to amputate the limb; but should the wound be small, so that its edges can be readily approximated, and not accompanied with such mischief as is likely to occasion sloughing; an attempt should be made to preserve the extremity.

Extent of mischief.

The principal object in the treatment, is to produce adhesion of the edges of the wound; to effect which, all our efforts should be directed. The application of sutures is necessary, not only to assist in the immediate approximation of the edges of the wound, but to prevent their after separation, which is otherwise liable to take place from the escape of synovia, and the lax state of the integument, besides the sutures, strips of adhesive plaister should be placed, and the part kept cool, by the evaporating lotion. Poultices or fomentations must not be used, as they prevent the adhesive process.

Treatment.

Case.

A man in St. Thomas's Hospital, under the care of Mr. Birch, had fomentations and poultices employed, after an injury of this nature, in which but a small wound communicated the joint,—he died in consequence of excessive constitutional irritation, produced by suppurative inflammation, which took place in the joint.

The following case, which was under the care of Mr. Dixon, of Newington Butts, will fully explain the mode of treatment I would recommend.

Case.

Mr. Redhead, aged 39, of a spare habit, was thrown from his gig, June 18, 1819, when his knee, striking against the wheel of a cart, produced a compound fracture of his patella. At Mr. Dixon's request, I visited the patient in the afternoon of the day on which the accident had occurred, and on examining the joint, I found a wound on the fore part, which readily admitted my finger into the joint; the patella was broken into several pieces, one of which being detached, I removed. From the habit of the patient, and his not having an irritable constitution, we determined on attempting to preserve the limb. I accordingly brought the edges of the wound together by the application of a suture, taking care not to include the ligament; I then further secured

the closure of the wound by strips of adhesive plaister, and over the whole, I placed a roller very lightly, which was to be kept constantly moistened with spirit of wine and water. The leg was placed in an extended position, and he was ordered to live on fruit. The suture was not removed until the 30th of June, as he did not at all complain. At the expiration of a month, Mr. R. was allowed to leave his bed; and in five weeks from the accident, passive motion was commenced. He gradually recovered the perfect use of his limb.

In the year 1816, a case happened in Guy's Hospital, in which the knee joint was opened by ulceration, some time after the occurrence of a transverse fracture of the patella, which had united by a ligament about three inches in extent; the patient, a woman, was admitted into the hospital, in consequence of having numerous ulcers on various parts of her body, one of which was seated in the integument, immediately over the new formed ligament, uniting the broken patella; this ulcer became sloughy, and extended through this ligament into the joint, in which excessive inflammation and suppuration occurred, which destroyed the patient.

Case.

Of Oblique Fractures of the Condyles of the Os Femoris into the Knee Joint.

Signs of. Either the external or the internal condyle of the femur may be separated by fracture from the rest of the bone, producing much deformity of the knee joint, and giving rise to great swelling, which circumstances, together with the feeling of crepitus when the joint is moved, indicate the nature of the injury. In either case, the same mode of treatment is required.

Treatment. The injured limb is to be placed upon a pillow in the extended position; leeches and evaporating lotion are to be employed, until the inflammation is subdued; after which, a piece of stiff pasteboard, about a foot and a half in length, and of sufficient width to envelope the posterior and lateral parts of the knee joint, as far as the sides of the patella, is to be applied wet, and secured by a roller; this, when dry, adapts itself to the form of the joint, and best confines the fractured portion of bone. In five weeks, passive motion should be employed to facilitate the recovery of the motions of the articulation.

Compound fracture. Compound fracture of the condyles of the os femoris is a rare accident; and in the old,

or irritable, is most likely to be attended with fatal consequences, unless the limb be removed. In young persons, or in those not of an irritable constitution, a cure may be effected, unless the opening be very extensive, or attended with much surrounding mischief.

A boy was admitted into St. Thomas's Case. Hospital, in September, 1816, under the care of Mr. Travers, having a transverse fracture of the femur, just above the condyles, and an oblique fracture of the external condyle, with which a small wound communicated; the limb was placed in a fracture box in the semi-flexed position. The patient suffered but little from constitutional disturbance, although the integuments over the injured condyle ulcerated, so as to expose the bone, which was removed in November, in consequence of its losing its vitality. After this, the limb was placed in the straight position, as ankylosis was deemed unavoidable, but the lad recovered with a perfectly useful joint.

Of Oblique Fracture of the Femur, just above the Condyles.

The consequences of this injury are often Consequence. very lamentable, producing great deformity

of the limb, and destroying, in a great measure, the motions of the knee joint.

Causes.

The injury is generally produced by a fall from a height upon the feet, or upon the knee when the joint is very much flexed.

**Specimen
of, ex-
amined.**

Mr. Paty, surgeon of Bouverie Street, Fleet Street, has a preparation, showing the great deformity consequent on this injury, it was taken from a subject brought into the dissecting room at St. Thomas's Hospital. Before dissecting the parts, it appeared that the femur had been fractured just above the condyles, and that the inferior part of the superior portion of the bone projected as far as the upper part of the patella, being only covered by the skin; the size of the bone was much increased. On examining the seat of injury, the end of the superior portion of bone was found to have pierced the rectus muscle, through which it continued to project. The patella could not be drawn upwards, as it was stopped by the extremity of the bone. The condyles of the femur and the inferior portion of bone had been drawn upwards and backwards by the action of the muscles, behind the inferior part of the superior portion, and had united to it very firmly.

Independent of the deformity in this case, the motions of the knee-joint must have

been very limited, as the rectus muscle was hooked upon the projecting extremity of bone anteriorly, which also prevented the ascent of the patella.

The best mode of treatment to obviate these great evils, is first to flex the joint as much as possible, to liberate the rectus muscle at the same time supporting the condyles over some fixed body, to prevent their receding, and afterwards the limb must be firmly extended, to prevent retraction.

Best mode
of treat-
ment.

The following cases will explain the difficulty of effecting these objects ; the first was under the care of Mr. Welbank, junior.

A gentleman of middle age, a tall and powerful man, was thrown from his gig in June, 1821. The medical attendant, who was called to see him, found him lying on a bed, to which he had been carried, with his right leg bent across the left at an angle. At first view, it appeared that there was a lateral dislocation of the knee, a deep hollow was seen on the outer side, in the situation of the condyles, and above it a sharp projection. On examining more attentively the seat of injury, an oblique fracture of the femur was found just above the condyles ; considerable effusion existed in front of the joint, around the patella, which could not be distinctly felt. After the fracture had been

Case.

reduced, which was readily effected by slight extension, a ridge could be felt just above the patella, which, upon a superficial examination, might have been mistaken for a transverse fracture of that bone. If the limb was flexed, a great deformity resulted from the projection of the upper portion of the fractured bone, which disappeared again on extending the limb. The sensation of crepitus was very indistinct.

The extremity was placed in an extended position, and secured by the application of short splints, for the space of a week, during which time means were employed to reduce the inflammation of the capsule, consequent on the injury. After this, a long splint was applied on the outer side of the limb, from the trochanter major to the foot, and a shorter one on the inner side, from the middle of the thigh to the middle of the leg; these were firmly confined by bandages, and the limb was supported upon an inclined plane. In consequence of frequent variation in the projection of the upper portion of bone, weights were subsequently appended to the foot, to keep up a constant extension, which appeared to be advantageous.

In September following, the union was thought to be sufficiently firm, and the patient was carefully removed to Eastbury,

Herts, in a litter-carriage, with his limb still in the same position. It being found, however, that alteration of posture, or any attempt to flex the limb, produced a greater projection at the seat of fracture, the former plan of treatment was continued for another fortnight. Upon a further examination after this period, a degree of lateral motion could yet be felt, and the projection of the fractured bone was still increased by bending the knee, indicating that the union was not yet firm, in consequence of which the limb was again placed at rest, and a circular belt was tightly buckled around it at the seat of injury, to press the fractured parts together, and to maintain them in firm apposition. In the middle of October, the patient was first allowed to get up, the union being then complete, and he has since gradually recovered the use of the limb, so as to be able to walk without assistance, but he has little power of bending his knee, the upper part of the patella being caught against the projecting portion of the femur, which is still evident. The limb is somewhat shortened, and the thigh inclined outwards.

Mr. Kidd, who was tall, muscular, and Case.
in weight fifteen stone, fell from a height of twenty-one feet, and by the severity of the concussion, fractured his thigh bone ob-

liquely, just above the condyles, and the lower part of the superior portion of the bone penetrated through the rectus muscle and integuments, appearing just above the patella. He was immediately carried home, and I was requested to see him by Mr. Phillips, Surgeon to the King's Household, who had been called to him. The projecting extremity of the superior portion of bone was sawn off, and the fracture reduced, when the edges of the wound were carefully brought together, and the limb was placed over a double inclined plane. The wound healed without difficulty, which was extremely favourable. The accident occurred on the 9th of November, 1819, and on the 30th, splints were applied to press the bones together. December 23, the limb was placed in an extended position, which was continued until the beginning of February. The patient was then allowed to sit up; but on a careful examination of the limb, the union of the fracture was ascertained not to be complete, and a leather bandage was therefore placed around the injured part, and tightly buckled, to secure the bones in a proper position. On the 3rd of May, the union was found to be complete, and a few days after the bandage was removed, the limb being supported by a pillow. He was

still unable to leave his bed in consequence of the great swelling of the leg, and some degree of superficial ulceration from the application of the leather bandage. On the 19th of July, he was removed from London to Kensington upon a litter. A considerable period elapsed before the swelling of the limb subsided, or before he was able to be moved to a sofa. At the end of January, he was on crutches for the first time, and took his first walk out of doors, near the close of the following month.

After union was complete, the inferior part of the upper portion of the bone, which had been broken, continued to project, its size was very much increased, and the patella was fixed to its extremity, to which also the skin adhered.

I have had an apparatus constructed, which, I think better calculated to preserve the limb in a constant state of extension, than that employed in either of the above cases. It consists of a straight splint, long enough to reach from the upper and inner part of the thigh, as far as several inches below the sole of the foot; the upper extremity is hollowed and padded, so as to fit in between the scrotum and thigh, against the side of the pubes; and the lower part resembles that described and employed by

Apparatus
for extension.

Bayer; having a boot which fixes by the sole, to a bolt projecting at right angles from the splint; the bolt is connected with a screw, let into the lower part of the splint, and on turning this screw, the bolt is carried upwards or downwards, according as the screw is moved to right or left. After having liberated the rectus muscles from the broken extremity of bone, by bending the knee as before directed;—the limb is to be extended, and the apparatus applied on the inner-side of the limb, in the following manner:—The upper padded end being placed between the scrotum and thigh, against the side of the pubes; the foot is to be received into the boot, and confined there by closing the front with a lace in the usual manner, or with straps and buckles; then by turning the screw, the bolt connected with the sole of the boot, and consequently the boot and foot are made to descend, thus a powerful mode of extension is afforded, the upper part of the splint being fixed against the pelvis, the whole force of the instrument is exerted upon the limb.

Of Fracture of the Head of the Tibia.

Nature of. A fracture sometimes occurs obliquely through the head of the tibia into the knee.

joint, in which a mode of treatment very similar to that recommended for the oblique fracture of the condyle of the femur is necessary ; viz. an extended position of the limb, in which the extremity of thigh bone tends to keep the fractured bone in its proper situation ; the application of a piece of wetted paste board, and a bandage. Passive motion should be employed early.

Should the fracture not extend so high as the joint, the semi-flexed position of the limb over a double inclined plane will be best, as the weight of the leg then counteracts the efforts of the muscles, which would otherwise draw up the inferior portion of the broken bone.

If not connected with the joint.

Of Dislocation of the Head of the Fibula.

This accident may occur from violence or relaxation of ligament. I have only seen one case from the former cause, which was accompanied with a compound fracture of the tibia, requiring the removal of the limb.

Causes.

The displacement in consequence of relaxation is more frequent ; the head of the bone slips backwards, it can be easily replaced ; but unless confined in its proper situation, it is directly dislocated again.

From relaxation.

Treatment. The first object in the treatment is to promote the absorption of an effusion of synovia which exists in the joint; this may be effected by repeated blistering, and afterwards a strap should be employed to buckle around the upper part of the leg, with a small pad attached to it, which should press behind the head of the bone, to retain it firmly in its natural situation.

LECTURE XLV.

On Dislocations of the Ankle Joint.

This articulation, which is formed by the tibia, fibula, and astragalus, with their cartilages, and synovial membrane, is so strongly protected by the form of the joint, and the numerous ligaments connecting these bones, that great violence is necessary to produce a dislocation, and when this does occur, it is generally accompanied with fracture, the ligaments often affording more resistance than the bones.

Strength of
the joint.

The tibia may be dislocated in three different directions, viz. inwards, forwards, and outwards; a displacement backwards is also said sometimes to take place. Cases have likewise occurred in which the foot has been thrown upwards, the astragalus being received between the tibia and fibula, in consequence of the ligament, which unites these bones, giving way; but this is only a severe form of the internal dislocation.

Three
forms.

Of Simple Dislocation of the Tibia, inwards.

Appear-
ances.

This is the most common of the dislocations of the ankle. The malleolus internus forms a projection under the skin, on the inner side of the foot, and the integument is so much distended as to appear in a bursting state;—the foot is turned outwards, so that its inner edge rests upon the ground, when the patient is erect,—a depression exists above the outer ankle, but there is otherwise much swelling; a crepitus can be usually felt about three inches above the external maleolus on moving the foot, which can be done laterally without difficulty, but the motion creates violent pain.

On dissec-
tion.

The appearances upon examining the seat of injury by dissection, are the following:—the end of the tibia rests upon the inner side of the astragalus; instead of on its upper articular surface; and if the accident has occurred from a person jumping from a considerable height, the lower end of the tibia where it is connected to the fibula by ligament, is broken off, and remains attached to the fibula, which is also fractured from two to three inches above the maleolus, and the end of the superior portion of the fibula is carried down upon the upper surface of the

astragalus, occupying the natural situation of the tibia; the inferior portion of the fibula with its maleolus remains in its natural position, and the ligaments connecting it to the tarsal bones are uninjured.

The most frequent cause of this accident Causes. is jumping from a great height, or it is sometimes produced by the foot being caught whilst a person is in the act of running, with the foot turned out, so that the foot is fixed whilst the body is carried forwards.

The reduction of this dislocation, which Reduction. should be effected as soon as possible, may be accomplished in the following manner:—place the patient upon a mattress, properly prepared, on the side which corresponds to the injured limb, and bend the leg at right angles with the thigh, so as to relax the gastrocnemii muscles; then fix the thigh whilst an assistant draws the foot gradually in a line with the leg, and at the same time press the lower extremity of the tibia outwards towards the fibula, to force it upon the articulatory surface of the astragalus.

Great violence will often fail in reducing this dislocation, if the limb be kept extended; Reason of failure. when, in the same case, the replacement may be very readily effected after the leg has been bent in the mode I have described. The difficulty in the former instance is from

the powerful resistance of the gastonemii muscles.

Treatment. After the reduction, the limb is still to be kept upon its outer side, being surrounded by a many tailed bandage, and supported upon a well padded splint which has a foot piece; a second splint also furnished with a foot piece is to be placed on the opposite side of the limb, or that which is uppermost; and these splints are to be so secured as to prevent eversion of the foot, and to preserve it at right angles with the leg. The bandage is to be moistened with an evaporating lotion. The subsequent inflammation must be kept within bounds by local or general bleeding as necessary, and the secretions must be attended to.

Period of care.

About five or six weeks after the accident, the patient may be allowed to leave his bed, having the joint well supported by the application of straps of plaister around it. After eight weeks, passive motion and friction should be employed to restore the motions of the joint.

Of Simple Dislocation of the Tibia, forwards.

Appearances.

This accident produces the following appearances:—the foot seems much shortened,

the toes are pointed downwards, and the heel projects. The inferior extremity of the tibia forms a large projection upon the middle and upper part of the tarsus, under the extensor tendons, and a depression exists before the tendon achillis.

When examined by dissection, the tibia is found to rest upon the upper surface of the navicular and internal cuneiform bones, but a small part of its articular surface still is in contact with the articular surface of the astragalus. The fibula is broken, and the superior portion of the bone is carried forwards with the tibia; whilst the malleolus externus, with two or three inches of the lower part of the fibula remains in its proper situation; the capsular ligament is lacerated extensively on its fore part, and the deltoid ligament is partially torn through.

On Dissection.

The most frequent causes of this injury are, a fall backwards at the time that the foot is confined, or jumping from a carriage in rapid motion, whilst the toes are pointed forwards.

Causes.

To accomplish the reduction, the patient should be placed on his back upon a mattress, and the thigh being elevated towards the abdomen, the leg is to be bent at right angles with the thigh; the foot is then to be extended in a line a little before the axis of the

Reduction.

leg, the thigh being fixed, and the tibia pressed backwards to its natural position.

Treatment. When the reduction has been effected, the many tailed bandage, and padded splints are to be applied as in the former case, and the same means adopted to prevent excess of inflammation. The position of the limb should be upon the heel, with the knee bent, and the foot well supported. After five weeks the patient may be allowed to get up, as the fibula will then be united; and passive motion may be carefully used.

Of the partial Dislocation of the Tibia, forwards.

Nature of. In this accident, the tibia does but half quit the articular surface of the astragalus, resting in part upon the navicular bone, and in part on the astragalus.

Signs of. The signs of the injury are, the pointing of the toes, the elevation of the heel, a great difficulty in placing the foot flat upon the ground, and a considerable loss of power in the movements of the joint. The shortness of the foot, or the projection of the heel, are not very remarkable; the fibula is broken.

Case. The first case of this injury which I saw,

was in a very stout lady at Stoke Newington, who supposed that she had sprained her ankle by a fall. The toes were pointed, and the motions of the ankle joint entirely destroyed. I attempted to draw the foot forwards, and to bend the ankle joint, but I could not succeed. Some years after, I saw this lady walking upon crutches, the toes were still pointed, and she could not place the foot flat upon the ground.

I was not, however, perfectly acquainted Dissection. with the precise nature of the injury she suffered from, until my friend, Mr. Tyrrell, showed me a foot which he had dissected at Guy's Hospital, and which he was so kind as to give me. It presents the following appearances : the articular surface of the lower part of the tibia is divided into two, the anterior part is seated on the navicular bone, the posterior upon the astragalus ; these two articular surfaces formed at the lower extremity of the bone have been rendered smooth by friction ; the fibula had been fractured.

The mode of reducing this partial dis- Reduction. placement should be in every respect similar to that recommended for the complete dislocation, the same directions for the after-treatment should also be adopted. As the signs of the injury are not very well marked,

great attention will be required in the examination, and the surgeon should not rest satisfied until the motions of the joint are in a great measure restored.

Of simple Dislocation of the Tibia, outwards.

This injury is usually attended with much more surrounding mischief than either of the former, as it is produced by greater violence; there is more laceration of ligaments, and more contusion of the integument.

Appear-
ances.

The sole of the foot is turned inwards, and its outer edge rests upon the ground, when the patient is standing; the foot and toes are pointed somewhat downwards, and the external malleolus forms so decided a prominence upon the outer side, by protruding the skin, that the nature of the accident can scarcely be mistaken.

On dissec-
tion.

Upon dissection, the malleolus internus of the tibia is found obliquely broken from the shaft of the bone; the inferior portion of the shaft of the tibia is thrown forwards and outwards upon the astragalus before the malleolus: the deltoid ligament remains entire. If the fibula is perfect, the three ligaments naturally connecting it to

the tarsus are ruptured ; but when the fibula is fractured, which often happens, these ligaments are not injured. The astragalus is sometimes broken, and the capsular ligament is lacerated.

The injury may be occasioned either by a fall or jump from a height, the foot being twisted inwards, or by the passage of a carriage wheel over the articulation..

To effect the reduction, place the patient Reduction.
upon his back, elevate the thigh towards the abdomen, and bend the leg at right angles with the thigh ; then fix the upper part of the leg and thigh, whilst an assistant extends the foot in a line with the leg, and at the same time press the tibia inwards towards the astragalus.

When reduced, apply the many-tailed Treatment.
bandage and padded splints with foot pieces, as in the former cases ; but in addition, place a pad over the fibula, just above the outer malleolus, so that when the limb is laid upon the outer side, which is the best position, the portion of bone above the pad may be raised, and the pressure of the outer malleolus upon the injured integument may be prevented.

A similar mode of after treatment to that described for the other dislocations, will be proper, but more depletion will usually be

required after this injury, as the inflammation is generally more violent. Passive motion should be employed after six weeks from the accident.

Of Compound Dislocations of the Ankle Joint.

Nature of.

The only difference between these injuries and those already described is, that in these cases the integuments and ligaments are divided, either by the bone, or by the pressure of some uneven and hard body, on which the limb may have been thrown, so as to expose the joint from which the synovia escapes through the wound.

Consequences.

The consequences of these injuries are, however, very different from those occasioned by the simple dislocations; usually the following effects are produced. The synovia at first escapes through the wound, and in a short time after the accident, inflammation commences; this inflammation extends to the ligaments as well as to the extremities of the bones forming the joint, and the secretion from the joint becomes much increased. In about five or six days, suppuration commences; at first the discharge of matter is small, but it soon becomes very profuse. Under this process of suppuration,

the articular cartilages become partially or wholly absorbed, but in general only partially; the ulceration of the cartilage is a very slow process, usually attended with much constitutional suffering, and is often followed by exfoliation of bone. When the cartilages have been removed, granulations arise from the extremities of the bones, and from the ligaments, which inosculate and fill the cavity of the joint. In some cases, adhesive inflammation occurs in the commencement, and the articular surfaces become united without any absorption of the cartilages; this often occurs in part, but I have seen it extend to the whole surfaces.

But neither the adhesive union, nor the inosculatation of the granulations entirely destroy the motions of the joint, if passive motion be employed sufficiently early and carefully; and I have seen, in some cases, the mobility of the articulation restored to nearly its original extent; otherwise, the other joints of the tarsus acquire such an increase of motion, as to render the deficiency in that of the ankle hardly perceptible. When the powers of the joint are completely destroyed, it is by a deposit of cartilage, and a subsequent formation of phosphate of lime, as is usual in the reparation of fracture of bones.

Anchyl-
osis
does not al-
ways follow.

Constitutional
symptoms.

The various local effects which I have described are accompanied usually with much constitutional suffering. About twenty-four hours, or in two or three days after the receipt of the injury, the patient begins to complain of pain in the head and back, shewing the influence of the accident upon the brain and spinal marrow. Loss of appetite, nausea, and often vomiting, indicate disorder of the stomach; the tongue is white, yellowish, or brown, according to the degree of irritation; the bowels generally become inactive, from a paucity of the secretions, not only from their mucous surface, but from the glands connected with them, as the liver, pancreas, &c.; the secretion of the kidneys is much diminished, and of a deep colour; the skin becomes hot and dry, ceasing to pour out the perspirable matter. The action of the heart and arteries is accelerated, the pulse becoming hard, and in severe cases it is often irregular or intermittent. The respiration is hurried in sympathy with the quickened circulation. When the irritation is great, the nervous system becomes further affected, the patient is restless and watchful, and as the severity of the case increases, delirium subsultus tendinum, or tetanus occur.

Such are the usual effects of local irritation upon the constitution, but the degree in

which they are developed depends upon the irritability of the system, the powers of reparation, and the extent and violence of the injury.

The cause of the severity of the local and constitutional symptoms in these cases appears to be the exposure of the joint, and the great efforts necessary for the reparation of the injury under such circumstances, as the simple dislocations very rarely occasion these distressing effects, but the adhesive process repairs the mischief, without giving rise to either much local or constitutional disturbance. Thus the first principle in the treatment of the compound dislocation is clearly pointed out, viz.: the closure of the wound, and the aiding, by all means in our power, its union, by adhesive inflammation; so as to prevent suppuration in the cavity of the joint.

Cause of symptoms.

Formerly, and within my recollection, it was thought expedient for the preservation of life, by many of our best surgeons, to amputate the limb in these cases; but from our experience of late years, such advice would in a great majority of instances be now deemed highly injudicious.

Amputation formerly performed.

The mode of treatment to be adopted in these cases is as follows, and will apply generally to either form of dislocation.

Treatment.

The first object will be to suppress hæmorrhage, if any of consequence exists. Of the two arteries, the anterior and posterior tibial, which are likely to be wounded, the former will be found most frequently injured, the latter generally escaping; but in case of bleeding from either, it will be necessary to apply two ligatures, one above and another below the aperture from which the bleeding occurs. The projecting extremities of the bones are often covered with dirt, having been thrust against the ground; when the next step will be to cleanse them thoroughly from every particle of extraneous matter, otherwise it will afterwards excite suppurative inflammation in the joint. Should the bone be comminuted or shattered, all the detached portions must be carefully removed, and if the wound is not sufficiently large to allow of their being taken out without much difficulty, it should be enlarged with a scalpel, but the incision should be made in such a direction, as will avoid further exposure of the joint. The wound will sometimes require dilatation, if the integuments are nipped into the joint by the projecting bone, as they cannot be in many instances liberated without.

The reduction of the dislocation is to be accomplished by the same means as already

described in the simple displacements, and when reduced, the edges of the wound are to be very carefully approximated by sutures and strips of plaister, over which a piece of lint, dipped in the patient's blood, is to be placed; this, when the blood coagulates, forms, as far as I have seen, the best covering for the wound. The part is to be further supported by the application of separate pieces of linen, in the same way as the many-tailed bandage, but each portion being unconnected with the others, so that any one piece can be removed, and another substituted for it, by tacking the ends of the old and new strips together, before the former is drawn from its situation; in this way the limb is not disturbed by the change. This bandage is to be moistened by an evaporating lotion. The padded splints are lastly to be employed with foot pieces, as recommended in the simple dislocation, but a portion of that one situated on the wounded side of the limb should be cut out, in order to enable the surgeon to dress the wound without removing the splint. The position in which the extremity should be placed is the same as in the simple injury, but must be occasionally varied a little according to the seat and extent of the wound.

The next object will be to prevent or

Constitutional remedies.

diminish the constitutional suffering likely to ensue; in some cases it will be necessary to take away blood generally, but this should be done with the utmost caution, as great power is required to support the after process of restoration, which will fail altogether if the patient be rendered feeble by the loss of blood or other means. Purgatives should also be administered with great care, as the frequent change of position which the action on the bowels necessarily occasions, tends very much to interrupt or destroy the adhesive process, which it is our chief object to promote. I am confident that I have seen many cases of compound fracture prove destructive under such circumstances. The bowels should be emptied as soon as possible after the accident, before the adhesive inflammation is set up, after which a mild aperient may be given at intervals.

After
treatment.

Should the patient remain free from pain, this mode of treatment should be persevered in until the adhesive process is complete; but should he complain of suffering in the injured joint, the dressings must be cautiously raised, so as to expose a very small part of the wound, to allow of the escape of any matter which may have formed, but not to disturb any adhesions which have taken place. If the suppurative inflammation has

commenced, the first dressings may be removed, and the surface of the wound be merely covered with some simple dressing. Should much surrounding inflammation arise, it will be necessary to apply poultices on the wound, and leeches upon the limb, at a little distance from it, and afterwards to continue the use of the evaporating lotion over the inflamed surface not covered by the poultice. When the inflammation has subsided, the use of the poultices should be discontinued, as they relax the vessels too much, and retard the progress of cure.

In favourable cases, the wound heals in a few weeks with but little suppuration. In those less favourable, the discharge is very copious, and portions of the extremities of the bones exfoliate, rendering the recovery very tedious. Even in the most favourable instances, the patient cannot venture to use crutches before the expiration of three months, and often not until a much more distant period.

Period of
recovery.

I shall now relate a few cases, which will further explain the best mode of treatment, and also show the impropriety of recommending amputation indiscriminately in these cases.

In the year 1797, I attended a gentleman with Mr. Battley, who then practised as a

Case.

surgeon. This gentleman had, in a fit of insanity, jumped from a two pair of stairs window into the street, by which he caused a compound fracture of the ankle joint ; he, nevertheless, got up without assistance, and having obtained admission into the house, he ascended the stairs to his bed-room, and having fastened the door, got into bed. The door was forced open, as he would not unfasten it. When I examined the injured limb, I found that the tibia was dislocated inwards, and that the astragalus was broken into many pieces, many of which being detached I removed. We then reduced the displaced bone, and having approximated the edges of the wound, covered the whole with lint wetted with the patient's blood. The limb was placed on the outer side, with the knee flexed, and an evaporating lotion was freely applied. In three or four days after, considerable inflammation took place, but this was subdued by general and local bleeding, with emolient applications to the wound ; extensive suppuration followed, and continued very profuse for nearly two months, when the surface was covered by granulations ; at the same time an improvement took place in his mental affection, which became less and less as the wound closed ; between four and five months from the accident, the

healing process was complete, and the state of his mind natural. At the expiration of nine months he returned to his employment, but could not walk without the aid of a stick for many months.

In October, 1817, I was called by Mr. Case. Clarke, a surgeon, residing in Great Turnstile, Lincoln's Inn Fields, to visit Mr. Caruthers, a young gentleman who had a compound dislocation of the ankle joint inwards, occasioned by the overturning of a stage-coach at Kilburn, from which place he had been removed to Lambeth where he resided. The extremity of the tibia projected to the extent of between two and three inches from a wound through the integuments on the inner side. The tibia was broken, a small portion of it remaining attached to the joint by the ligaments; the fibula was also fractured badly. I found it necessary to enlarge the aperture in the integuments, before I could replace the dislocated bone. After the reduction, simple dressings were spread over the wound, these were confined by a many-tailed bandage, moistened with an evaporating lotion, and the limb was supported by the padded splints, and placed in a semiflexed position upon a quilted pillow. The patient was bled, and took mild purgatives, with saline medicines. Considerable

local and constitutional suffering followed, which greatly exhausted the patient; abscesses formed in the leg, and some exfoliation took place, much retarding the progress of cicatrization. These abscesses were freely opened, and the parts supported by strips of plaister; the limb was kept cool by the use of evaporating lotion, and the strength was supported by giving bark and wine. In the January, 1819, the last exfoliation occurred, after which the wound healed rapidly, and the patient recovered his health. Mr. Caruthers has since obtained very considerable use of the limb, being able, he told me, to walk six or eight miles if necessary.

Case.

Mr. Abbott, of Needham Market, Suffolk, sent the particulars of the following interesting case, which occurred under his care.

Mr. Robert Cutting, aged seventy, corpulent, intemperate, and of a gouty habit, had his ankle dislocated in consequence of being thrown down in a quarrel; the end of the tibia was forced through the integuments, and protruded about four inches; the fibula was fractured a few inches above the joint, and the foot was turned outwards. Immediately he got up, and in struggling to stand, he covered the end of the bone with dirt and sand, of which also a considerable

quantity got into the joint. He was conveyed home about four miles in a cart, and Mr. Abbott saw him about five hours after the accident, and recommended amputation in consequence of the extent of injury, and the disordered state of the patient's constitution; but this the patient could not be induced to submit to, therefore the injured parts were carefully and thoroughly cleansed with warm water, the dislocation was reduced, and the edges of the wound were nearly brought into apposition by strips of linen dipped in the *tinctura Benzoini composita*, without sutures or adhesive plaister; a thin board, hollowed to receive the leg, and with an opening in the situation of the outer ankle, being well padded, was placed under the outer side of the limb, which was enveloped in a folded flannel bandage, from the foot to the knee; the leg was laid in a flexed position, with the foot a little raised. The patient was bled to $\frac{3}{4}$ xiij, and ordered a mild saline purgative every two hours, until the bowels were relieved, with milk broth for his food.

The accident happened on the 25th of April, 1802; and he proceeded very favourably until the 27th, when he complained of darting pains in the injured limb, and he was restless, yet his skin and bowels were

acting properly. Upon unfolding the flannel, some swelling appeared about the joint, and some gleet discharge escaped from beneath the dressing; the inflammation did not appear much more than necessary, but six leeches were applied at a little distance from the seat of inflammation, which relieved the pain, and the wound was dressed as before. This plan of treatment was continued, and the case proceeded most favourably; on the 2d of May, a small quantity of matter was discharged, but without augmenting the symptoms. After ten weeks, he was moved daily from the bed to a sofa, and about this time the whole of the dressings were taken off for the first time, when the wound was found to be completely cicatrized; previously, only small portions had been elevated at a time, and fresh pieces put on to keep the covering perfect. When exposed, the exterior of the joint presented its usual appearance, excepting a slight enlargement in the situation of the cicatrix; but this was not more than could be expected. At the end of five months, he was allowed to go on crutches, and bear as much weight on the limb as his own feelings suggested to be proper. Being a butcher by business, he afterwards rubbed the limb with the fluid obtained from the joints of animals,

and also frequently placed his foot and ankle in the warm paunch of an ox. Before the expiration of twelve months, he could walk without the assistance of a stick, and for many years before his death could walk with perfect ease and freedom. He lived to the age of eighty-three.

The following are the particulars of a case sent to me by Mr. Scarr, Surgeon, at Bishop's Stortford; he also sent the patient for my inspection, after his recovery, so that I had an opportunity of witnessing the happy result of Mr. Scarr's skill.

John Plumb, aged 38, had ascended on a ladder, about ten feet from the ground, with a sack of oats upon his shoulders, when the ladder slipped from under him, and he fell to the ground upon his feet, still retaining the load of oats. Mr. Scarr was passing at the time, and immediately attended to the man. When his stocking had been removed, the tibia and fibula were found projecting through the skin at the outer side of the ankle, and the astragalus was exposed through an opening on the inner side; both the wounds were clean, and without much surrounding mischief. Mr. Scarr therefore immediately reduced the displacement, and closed the wounds by the application of adhesive straps, and placed the patient in

bed, with the limb flexed, and laid upon the outer side. The limb was moistened with a lotion of acetate of lead. About $\frac{3}{4}$ of blood were taken from the arms; some saline medicines administered; and the antiphlogistic treatment persevered in, with due regard to his constitutional powers; some abscesses formed, which were opened in the most favourable points, and the patient became gradually convalescent in about six months, without any very urgent symptoms. At the end of twelve months, he was able to resume his laborious occupation as before the accident.

Removing
a portion
of bone.

It has been recommended in the treatment of these cases, to remove with a saw the projecting extremity of the tibia, before the reduction of the dislocation is attempted; there are some instances in which such a proceeding is absolutely necessary, and many reasons are given for adopting this practice in general.

When necessary.

The cases in which it must be necessarily adopted are the following :

First, when the dislocation cannot be otherwise reduced without great violence.

Secondly, when the extremity of the bone is fractured obliquely, so that if reduced it immediately glips from its proper situation, when the extension is discontinued; but

after the removal of the point by the saw, it rests readily upon the astragalus.

The reasons assigned for adopting this plan in all instances are, Reasons for, generally.

First, That the shortening of the bone relaxes the muscles, and diminishes the tendency to spasmodic contractions, which so frequently occur when much force has been used to replace the bones.

Secondly, That the adhesive process goes on much more readily from the sawn extremity of the bone than from the natural articular surface, consequently the local irritation is less.

Thirdly, That when the suppurative inflammation does occur, it is rendered much less, as there is not the same extent, by nearly one half, of cartilaginous surface to be removed by ulceration, and thus by the diminution of the ulcerative and suppurative process, the constitutional irritation is much lessened.

Fourthly, It has been remarked, that those cases have usually recovered quickly, in which the extremities of the bones have been broken into many small pieces, and separated so as to render their removal necessary.

Fifthly, I do not recollect any instance of unfavourable termination, when this practice

had been pursued; but I have known many unsuccessful in which it had not been adopted.

Objections
to.

The objections made to this treatment are, first, that the limb must be shortened by the removal of the portion of bone, and, secondly, that the joint must afterwards become ankylosed.

Not im-
portant.

Provided we admit that the danger of the case is lessened, which I believe, by the sawing off the extremity of the tibia, the first objection cannot be considered of much weight, more especially as the defect is so easily remedied afterwards, by increasing the thickness of the sole of the boot or shoe. With regard to the second objection, I do not imagine that ankylosis is at all a necessary consequence, having seen cases in which considerable motion remained after the removal of bone, and recovery of the patient. I know that ankylosis is liable to take place in either mode of treatment, but even then the patient, after a time, walks with very little halt, as the other tarsal joints acquire so much increase of motion.

Treatment
adapted to
the case.

It appears to me, however, that either plan may be adopted, according to the features of the case, and I should not wish it to be supposed that I recommend the one to the entire exclusion of the other.

When the dislocation can be reduced without much force, and the bones retain their proper situation readily, without the occurrence of spasmodic muscular action; and if the patient be not very irritable, an attempt should certainly be made to effect a cure, without removing the ends of the bones; but if the bones be shattered, or fractured obliquely, so that it will not retain its proper position when reduced, the saw should be employed, in the first instance, to smooth the ends of the bones, when the small separate pieces have been taken away, and in the second place, to make a surface to rest upon the astragalus. I would also rather use the saw, than employ great violence to reduce the dislocation otherwise; likewise in those cases where the spasmodic contraction of the muscles renders it extremely difficult to keep the injured joint in its natural position.

General principles.

I shall now relate some cases, which will afford an opportunity of judging better of the propriety of what I have stated.

Nathaniel Taylor, aged thirteen, was admitted into Guy's Hospital, in consequence of his having a compound fracture of his ankle joint. The injury had been occasioned by a boat falling upon his leg. The end of the tibia and the fractured extremity of the

Case.

fibula projected through an extensive opening at the outer ankle; the malleolus externus retained its natural situation and ligamentous connections. The foot was turned inwards, and hung so loosely, that the sole could be placed against the side of the leg. I tried to reduce the bones to their proper situations, but could not effect it, but by very great force, and as soon as the extension was discontinued, they again slipped from their places. Under these circumstances, those around me urged me to amputate the limb; but considering my young patient to be otherwise in good health, and not of an irritable habit, I determined to preserve the limb if possible. On a further examination, I discovered that the malleolus externus and inferior part of the fibula connected to it, although in its natural position, was very loose, and I therefore removed it, by dividing the ligaments with a scalpel, and I afterwards sawed off about half an inch of the end of the tibia. I then found that I could easily replace the bones, and that they retained their positions without difficulty. Having approximated the edges of the wound, I covered it with lint dipped in the patient's blood, and by strips of adhesive plaister; the limb was placed upon the heel, and supported by padded splints.

Scarcely any constitutional suffering occurred, but little suppuration took place, and the wound gradually healed. One abscess formed over the tibia, but did not give rise to any severe symptoms. He was allowed to get up, and to use his crutches after about two months, and at the expiration of four months he could walk very well. There appeared to be some motion at the ankle, but the tarsal joints had evidently acquired much increase of motion.

In December, 1818, I was called upon Case. to attend, with Mr. Jones, of Mount Street, a Mr. West, aged forty, who had severely injured his left ankle, by jumping from a one horse chair, alarmed at the horse's kicking.

When I first saw him, the extremity of the tibia projected through a wound in the integuments, at the inner side of the ankle, and a portion of skin was nipped into the joint by the bone, the foot was turned outwards, but hung loosely. Finding that our patient was of a most irritable constitution, and seeing that great violence must be employed to reduce the bone, and that to effect the reduction it would be necessary to enlarge the wound considerably, I considered it much better to remove the extremity of the tibia, in order to avoid these

evils. I therefore sawed off a portion of the bone, and then effected the reduction without difficulty, nor was there any disposition to further displacement from muscular contraction. The edges of the wound were next secured in contact, by the insertion of a fine suture, and the part was covered with lint wetted with blood, and a many-tailed bandage. The limb was secured by the padded splints, and placed upon the outer side, in a semi-flexed position. The patient was bled to the extent of $\bar{3}x$, some opium was given him, and the spirit lotion was freely applied to the extremity. On the third day, the foot exhibited slight vesications, and he complained of tension, and some pain, but this soon subsided. About the sixth day, the wound began to discharge a serous fluid, mixed with red particles; poultices were employed; the secretion soon became purulent, and continued to increase until the end of a month, when it gradually subsided. At the end of two months, the patient was allowed to get on to his sofa, as the joint appeared firm; a small wound still, however, existed, from which it was evident some small exfoliation would take place; this did not happen for several months. During the progress of the case, Dr. Pemberton was consulted in con-

sequence of the patient's having an extremely disordered state of stomach; but, notwithstanding, the symptoms produced by the accident were not more severe than those usually occurring in a common case of compound fracture.

Dr. Rumsey, of Amersham, was so kind as to send me the account of an excellent case of compound dislocation of the ankle, complicated with simple fracture of the thigh bone of the same limb; the following are the particulars :

Mr. Tolson, aged forty, was thrown from Case. a curricie, on the 21st of June, 1792, and in falling, dislocated his left ankle joint. Dr. Rumsey saw him about two hours after the accident, when he found a large wound at the outer ankle, through which the extremities of the tibia and fibula, with a portion of the astragalus, protruded; for the astragalus had been fractured, and one portion of the bone still remained attached to the tibia and fibula, the foot was turned inwards and upwards, and the skin of the outer side, beneath the wound, was very much confined by the dislocated bones. Dr. Rumsey, deeming further advice necessary, sent for Mr. Pearson, of London, and Mr. Henry Rumsey, his brother, a surgeon at Chesham; and during the absence of

the messengers, the patient directed Dr. Rumsey's attention to his thigh, which was then ascertained to be fractured at the superior part. This circumstance being considered by Dr. Rumsey and his brother as a decided obstacle to amputation, they determined on endeavouring to preserve the limb. Finding that they could not replace the bones without excessive force, Dr. Rumsey determined upon removing that part of the astragalus which was attached to the dislocated bones. Upon separating this portion of bone, it was found to be as near as possible the superior half, the fracture having been horizontal through its centre. After this had been taken away, Dr. Rumsey still found it necessary to divide a portion of the integuments, which had been confined by the dislocated bones, before he could readily effect the reduction. The bones being replaced, some lint, dipped in tincture of opium was laid over the wound; the whole was covered with a poultice made of oatmeal and stale beer, and the leg was secured with padded splints. On Mr. Pearson's arrival, he perfectly approved of the course which had been adopted.

In the night following, the patient became delirious, vomited, and his pulse was full and frequent; he was bled to $\frac{3}{4}$ x, and

ordered to take a common saline draught with antimonial wine and tincture of opium every four hours; the tartrate of potash and manna were given in sufficient quantity to relieve the bowels. He also experienced considerable pain in the ankle and thigh. On the 24th, these unpleasant symptoms had in a great measure subsided, and a discharge commenced from the wound; he continued the same plan of treatment, with the omission of the antimony, as his stomach was irritable. He continued doing well until the 28th, when the discharge became thin, and he was much troubled with pain and flatulence in the bowels; it was therefore considered necessary to alter his diet, and on the 29th, he was allowed a small quantity of animal food, some table beer, and port wine; the bark was also freely taken in substance and in decoction; he was much benefited by this change. The discharge soon became very copious, in consequence of which the wound was obliged to be cleansed frequently; the limb was therefore placed upon the heel, as the dressing could not be effectually accomplished without considerable disturbance, whilst it continued on the outer side. After the alteration of position, much more attention was required to prevent further displacement, as the foot had a tendency to incline inwards, causing the end of the fibula

to project at the wound ; this was however obviated, by placing some small wedges between the foot and the fracture box, on the inner side, and others between the calf of the leg and the box on the outer side. About the 30th, the use of the poultice was discontinued, and the wound was dressed with dry lint, over which a pledget, spread with the cerat: plumbi superacetatis, was placed, and confined by a bandage to keep up moderate pressure. The bark and opium were continued until the beginning of August, and the wound gradually healed with only one check from the confinement of matter, the cicatrization being completed about the middle of September. The union of the thigh bone also went on well, but as the state of the leg prevented the possibility of keeping up sufficient extension, a degree of curvature was produced by the junction. The patient was soon able to walk about with the aid of a stick only, and acquired a power of motion in the injured joint nearly equal to that of the sound limb.

Another excellent case occurred, under the care of Mr. Cooper, of Brentford, formerly my dresser, who obliged me by sending the particulars from which the following account is taken.

Case.

Thomas Smith, aged thirty-six, a painter, dislocated his ankle outwards, by a fall

with a ladder, his foot being caught between two of the steps. Mr. Cooper was fortunately passing at the time, and immediately attended to the patient. On examining the limb, he found that the fibula was broken about five inches above the outer malleolus, and the tibia fractured longitudinally three inches from the joint; the small inferior portion remained attached with the inner malleolus. About an inch and a half of the inferior part of the shaft of the tibia, and the broken end of the fibula projected through a wound in the skin, rather anterior to the malleolus externus. Mr. Cooper finding that moderate force was not sufficient to replace the bones, he divided a portion of integument, which was pressed in by the protruding bones, and he also removed, with a metacarpal saw, an inch of the tibia, and a small piece of the fibula, after which the reduction was easily accomplished. The edges of the wound were brought together by two sutures, and further secured by strips of adhesive plaister; over this the many-tailed bandage, and the padded splints were placed to support the limb, which was placed on the heel, and kept cool by an evaporating lotion. In the evening, an opiate was given, and he was ordered some aperient for the next morning.

Some slight bleeding occurred during the following night, but not sufficient to require a removal of the dressings, which were not, therefore, disturbed until the fourth day, when they were taken off, and the appearance of the wound was then favourable. On the eighth day, a slough had formed, about five or six inches in circumference; a poultice was therefore applied to the foot, and the evaporating lotion continued to the limb above; he also took port wine and bark, to support him under the profuse suppuration which followed. The slough separated on the thirteenth day, exposing a healthy granulatory surface, after which merely simple dressing was applied. In five weeks from the accident, the wound was perfectly healed; and in a little more than two months, the fractured bones had become so firmly united, that the patient was able to sit up. In three months he began the use of crutches, and eventually obtained almost a perfect limb.

This man had suffered frequently from colica pictonum, and had an extremely irritable stomach, he was also naturally of a nervous temperament, therefore but ill calculated to support the consequences of so severe an injury. He derived considerable benefit from the occasional use of the saline

effervescent mixture, and from the free exhibition of opium at night.*

* Although it is perfectly unnecessary to state more cases in confirmation of the correctness of Sir Astley's opinions respecting the treatment of these injuries; yet I think the following account of sufficient interest to warrant its relation:—

Timothy Holland, a very stout muscular man, aged about thirty-five years, employed as a labourer at the London Docks, was standing on the quay, close to one of the swing bridges, when the bridge was forcibly and unexpectedly swung round, and struck his right leg on the outer side, a little above the ankle, occasioning a severe compound dislocation inwards, for which he was brought to St. Thomas's Hospital, soon after the accident, on the 23rd of August, 1826.

I was immediately sent for, and on my arrival at the Hospital, found the patient placed upon a bed, with the injured limb in the following state:—About two inches of the inferior extremity of the tibia projected through an extensive wound on the inner side of the joint; the internal malleolus was broken off, and remained loosely attached by the deltoid ligament. The wound extended in two directions, one reaching from about three inches above the joint, a little to the outer side of the course of the anterior tibial artery, to the centre of the metatarsal bone of the great toe; the artery was completely exposed for more than three inches, but had not been wounded; the second portion of the wound extended from the former, immediately over the articulation, round the anterior and inner parts of the joint, as far as the back of the tendo achillis; the posterior tibial artery and nerve were also exposed to the extent of an inch, but otherwise uninjured. A portion of the inte-

These cases I think quite sufficient to show, that in very many instances, not only

gument, about four inches in circumference, near the inner side of the joint, appeared to have suffered considerably, but retained its sensibility. The fibula was fractured about three inches above its malleolus.—Notwithstanding the formidable appearance of the case, I found my patient cool, and willing to submit to any thing I proposed. His composure and time of life, when the constitutional powers are great, determined me to attempt the preservation of the limb. On endeavouring to replace the bones, I found it could be effected without much violence, but that they became again dislocated immediately the extension was discontinued, I therefore removed, with a saw, nearly an inch of the end of the tibia, and likewise took away the malleolus internus, which was but slightly connected by ligament. The reduction was then easily accomplished, and the disposition to further displacement no longer existed, excepting that the end of the tibia advanced a little forwards. This I easily remedied, by placing a long narrow splint on the posterior part of the limb, from the upper projecting part of the calf of the leg to the heel, and then fastening a broad piece of tape around the splint and leg, a little above the seat of injury, so as to press the heel forwards, and the end of the tibia backwards. The edges of the wound were brought together and secured by sutures and strips of soap plaister, over which, the many-tailed bandage and splints were applied; the limb was placed upon the outer side, in a semi-flexed position; the bandages were kept wet with a splint lotion; the patient passed a sleepless night, but was free from pain, his tongue was slightly furred, and his pulse quickened. These symptoms became alleviated

the life of the patient may be preserved without the removal of the injured limb, but that the extremity is, afterwards, infi-

by the action of some aperient medicine, and he proceeded very favourably until the 30th, when he complained of considerable pain in the ankle, and exhibited a good deal of constitutional derangement. The dressings being removed, that portion of the skin which had been so much injured at the time of the accident was found to be sloughing; otherwise the appearance of the wound was favourable. Some fresh strips of plaister were lightly applied, and covered by a poultice, and he was ordered some saline effervescing medicine. On the 5th of September, the suppuration had become profuse; the poultice was discontinued, and the wound was dressed with the nitric acid lotion over the slough, and simple cerate to cover the whole; the same position was observed, and he was allowed some meat and porter for the first time. From this period, only a slight check occurred in the cure, by the burrowing of some matter up the leg, which was relieved, by altering the position a little, and applying a small compress in the direction of the sinus. The wound was completely closed by the end of October; he was then allowed to sit up, but did not venture to bear at all upon the limb until some weeks after. He was discharged from the Hospital on the 28th of February, 1827, having regained a perfect use of his limb, wearing a shoe with the sole thick, in proportion to the shortening of the leg, with which he walked quite free from any lameness. I repeatedly examined the joint which had been injured, and could discover but a very trifling difference between its motions and that of the sound ankle.—T.

nately more useful than any artificial one could be, and that it may become nearly as perfect as previous to the accident.

Amputation sometimes necessary.

There are some circumstances, however, which render the operation of amputation absolutely necessary, and these I shall now briefly point out.

In old persons.

First, the advanced age of the patient, when the powers of the constitution are not sufficient to support the extensive suppurative inflammation likely to follow the injury, but which the operation of amputation does not expose the patient to.

For very extensive wound.

Secondly, A very extensive lacerated wound, with much hæmorrhage, will render it imprudent to attempt to preserve the limb.

For extensive fracture.

Thirdly, Extensive comminution of the tibia or of the tarsal bones, as the astragalus and calcis, will give rise to a necessity for amputation. When only some small portions of bone are broken off, they should be carefully removed, and the end of the bone be smoothed by a saw.

Wound of a large artery.

Fourthly, The dislocation of the tibia outwards, as it is generally accompanied with extensive injury to the soft parts, as well as to the bones, will often require the performance of amputation.

Fifthly, The division of a large artery

with an extensive wound, might render the operation necessary; but I should not, in all cases, recommend amputation on this account, more especially if the injured vessel was the anterior tibia, as I have known more than one instance of recovery, in which this vessel has been secured, and the limb saved. Division of the posterior tibial artery could hardly take place without injury to the large accompanying nerve, which would increase the necessity for removing the limb.

Sixthly; extensive contusion of the surrounding soft parts, likely to occasion the formation of large sloughs, would be a reason for amputating; this will generally happen when the injury has been occasioned by the passage of the wheels of a heavy laden wagon over the joint; or from the falling of a very heavy weight upon the limb.

Extensive
contusion.

These are the principal circumstances which render an immediate performance of amputation necessary; but there are others which may make it equally proper at a more distant period from the accident.

If mortification ensues, the operation will be required; it is, however, best in such a case, to wait until the extent of the mortification is clearly defined, before the amputation be performed, although I conceive, that when the mortification results from the

Mortifica-
tion.

division of a blood vessel, or from other local injury in a healthy constitution, a different practice may be adopted to that which would be proper if the disease arose from constitutional causes. I have known the arm amputated in consequence of mortification produced by a division of the brachial artery at the elbow; the mortification was extending at the time, but the patient did well, the limb being removed above the elbow. In another instance, where death of the foot had occurred in a case of large popliteal aneurism, the limb was amputated above the swelling, whilst the mortification was still proceeding up the leg, and the man recovered.

Excessive
suppur-
ation.

Should the suppuration from the joint be greater than the constitution can support, as I have seen it, amputation will be required to save the life of the patient.

Large ex-
foliation.

Again, when considerable portions of bone are exfoliating, and keeping up a continued state of irritation, if they cannot be removed without inflicting great injury, the operation of amputation should be performed.

Deformity
of limb.

Excessive deformity may result from negligence on the part of the surgeon, during the union of the wound, so as to make the limb worse than useless to the patient, when it will be necessary to remove it.

Case.

Mr. Norman, of Bath, amputated the leg

of a man in consequence of such deformity. The patient had suffered from a compound dislocation of his ankle inwards, accompanied with displacement of the astragalus, which was removed. After the union of the wound, it was discovered that the os calcis had been drawn up against the posterior part of the tibia, and had there become firmly united to it, the toes being pointed downwards, rendering the limb useless.

It has been recommended to amputate when tetanus occurs after this injury, but as far as my own experience goes, I believe that the operation only hastens a fatal termination. I have only seen one case of tetanus following compound dislocation of the ankle joint, which, in spite of every attention on the part of Dr. Relph, who attended the patient with me, destroyed life.

When
tetanus
occurs.

Although I have not witnessed the performance of the operation after the appearance of tetanic symptoms, when the injury has occurred in the ankle, yet I have known it tried in several instances, when this formidable affection has been produced from other injuries, and it appeared rather to hasten the progress of the disease than to relieve it.

Not advise-
able.

In a case of compound fracture just above the ankle joint, producing tetanus, the

Case.

limb was amputated ; the tetanic symptoms increased, and speedily destroyed the patient.

Case. In another instance, when tetanus had followed injury to the finger, amputation was performed, but without alleviating the symptoms, and the man died. I could relate other cases, all showing how unavailing the operation is under these circumstances.

Chronic tetanus. I have known a form of tetanus succeeding injuries, in which the symptoms have never been very severe, and which has been termed chronic tetanus ; this is sometimes gradually recovered from, although but little be done by medicine, and nothing at all by surgery. The medicine which I have seen most advantage from, has been calomel and opium ; and opium should be applied to the wound.

Excessive irritability. There are some persons who are naturally so excessively irritable, that the slightest injuries produce fatal consequences ; and in others again, possessing originally good constitutions, this extremely irritable state may be induced by excess of mental exertion, by intemperance, by great indolence, or other causes, so that very trifling accidents will destroy them. Those persons also, who are much loaded with fat, and especially those who, under such circumstances, are extremely indolent, generally bear important accidents

or operations very ill, and frequently perish in spite of the most cautious and attentive treatment.

Of Fractures of the Tibia and Fibula near the Ankle Joint.

Fracture of the fibula frequently occurs Of fibula.
about three inches above the outer malleolus.

The patient immediately experiences pain Symptoms of.
at the seat of the injury, which is much increased by any attempt to bear the weight of the body upon the limb; and in endeavouring to stand, he does not place his foot flat upon the ground, but rests it upon the inner side, to receive the weight chiefly on the tibia; the flexion or extension of the foot also augments his suffering. An inequality of the surface of the limb over the seat of fracture often exists, and a crepitus is readily distinguished, by placing one hand over the injured part, and by the rotating the foot at the same time with the other hand.

This fracture is produced by a blow upon Causes of.
the inner side of the foot, which forces it outwards against the lower part of the fibula: also, by a sudden and violent twist of the foot inwards. It is, perhaps, most frequently

occasioned by a lateral fall, when the foot is confined. I broke my right fibula by falling on my right side, whilst my foot was confined between two pieces of ice: I felt a snap in the bone at the time of the accident, and experienced pain from every jolt of the carriage in which I was conveyed home.

Treatment. The treatment necessary for this injury, consists in applying the many-tailed bandage, and to keep it wet for a few days with the spirit lotion; over this bandage, the padded splints with foot pieces are to be placed and secured, so as to support the great toe in a line with the patella. The limb should be laid upon a pillow on its side in a semi-flexed position.

Conse-
quence of
neglect.

Although no great deformity can arise from this accident, on account of the support afforded by the tibia, yet a considerable degree of lameness may result, if the case be neglected. Dr. Blair, a naval physician, who had fractured his fibula, and had not paid proper attention to the case, became in consequence unable to walk on flat ground without a lameness; as the foot was twisted by the irregular union of the broken bone.

Of tibia.

Fracture of the tibia often occurs at its inferior part, either extending into the joint, or seated immediately above it. If the fracture enters the joint, but little deformity is

produced ; but if above the articulation, the lower part of the upper portion of the bone usually projects a little. The foot is generally inclined somewhat outwards, but the injury is easily detected by the crepitus, which can be felt when the foot is freely moved.

This injury should be treated in every Treatment. respect as the former, but great care must be taken to prevent the inclination of the foot outwards, and to keep the great toe in a line with the patella. When the fracture takes place obliquely from within to without into the joint, the foot will be turned slightly inwards, and the malleolus externus will project more than usual ; it will be necessary therefore, in the treatment, to attend to this point, otherwise it will be the same. By placing the limb upon the heel, the proper position of it is more readily observed, but the case will do equally well, with attention, if the extremity be laid upon the outer side.

The observations respecting the compound Compound fracture. dislocations of the ankle joint, will be found generally applicable to the cases of compound fracture communicating with the articulation.

Of Dislocations of the Tarsal Bones.

Of astragalus.

From the situation of the astragalus, and its very firm ligamentous connexion to the tibia, fibula, calcis, and navicular bone, we could scarcely suppose its displacement possible, and although it is occasionally dislocated, yet the injury very rarely, if ever, occurs, without a fracture of one or more of the surrounding bones.

Reduction difficult.

When dislocated, it is extremely difficult to reduce, and if this be not effected, lameness to a considerable extent must be the consequence.

I had an opportunity of seeing a patient who was under the care of Mr. James, of Croydon, in consequence of an injury to the tarsal joint.

Case.

I found that the tibia was fractured obliquely at the inner malleolus, and that the astragalus was dislocated outwards. Every means which Mr. James could suggest had been tried to replace the bone, but it still continued to project upon the upper and outer part of the foot; so much force had been employed in making extension, that the integument sloughed in part. Considerable deformity resulted; the toes were pointed inwards and downwards, and the

motions of the joint were in a great measure destroyed.

I attended the following interesting case, with Mr. West, of Hammersmith, and Mr. Ireland, of Hart Street, Bloomsbury.

Mr. Downes fell from his horse on the 24th of July, 1820, and dislocated his astragalus. Mr. West, who first saw him, endeavoured to replace the bone, but could not succeed; he therefore placed the limb in splints, and kept the part moistened with goulard lotion. The patient was bled largely, and took some anodyne medicine. On the 25th, I visited Mr. Downes, with Mr. Ireland and Mr. West, when I found the astragalus displaced forwards and inwards, accompanied with a fracture of the fibula a little above its malleolus. All my attempts to reduce it proved ineffectual. The skin over it appeared in a bursting state, so much so, that I felt inclined to divide it and remove the astragalus; but knowing the resources of nature in accommodating parts under injuries, and of restoring the usefulness of the limb, I declined interfering, and the previous treatment was therefore continued. On the 28th, the skin over the bone began to inflame, and notwithstanding the employment of leeches and evaporating lotions, it sloughed on the 16th of August, exposing the astra-

Case.

galus, which gradually became loosened and dislodged. A profuse discharge attended this process, but bark and wine freely given kept up the constitutional powers ; the wound was poulticed. On October the 5th, I removed the astragalus, having only to divide some few ligamentous fibres. After this, the wound was dressed with soap plaister, and the patient gradually recovered, being able to walk without the aid of a stick.

**Compound
dislocation.**

In compound dislocation of the astragalus, the plan of treatment to be pursued has been already pointed out in the history of the compound dislocations of the ankle joint, from which it is evident, that the whole or a part of the astragalus may be removed, and yet the patient recover a very useful limb. If, however, the astragalus should still remain firmly attached, and can be replaced ; such treatment should be adopted in preference to taking it away.

Case.

Mr. Henry Cline had the following case under his care in St. Thomas's Hospital.

On the 21st of June, 1815, Martin Bentley, aged 30, was admitted into the Hospital, having been severely injured by the falling of some heavy stones upon his legs. An extensive compound fracture of the tibia and fibula existed in the left leg, near the middle, attended with so much mischief to the sur-

rounding soft parts, that Mr. Cline amputated the limb below the knee. On the right side, a dislocation of the astragalus had been produced, occasioning the following appearances:—the os calcis, instead of projecting at its usual place, formed a protuberance on the outer side of the foot, beyond the external malleolus; and beneath the malleolus was a considerable hollow; on the inner side, and below the internal malleolus was a remarkable projection, the toes were turned out, and the foot was inclined in the same direction: the astragalus must have been dislocated inwards, both from the calcis and os naviculare, so that its inferior surface, instead of resting upon the upper part of the os calcis, was placed against its inner side. The reduction was accomplished by bending the leg at right angles with the thigh, and extending the foot in a line with the leg, the knee being fixed; at the same time, Mr. Cline placed his knee upon the outer part of the joint, and pressed the foot firmly against it, forcing the bones into their natural positions. The limb was enveloped in a bandage, and placed as much as could be on the outer side, upon a well padded splint, to which it was secured by tapes. The spirit lotion was applied. On the 1st of July, the man had some sickness and pain, which was

relieved by bleeding, otherwise he recovered without any urgent symptoms, and was dismissed from the Hospital on the 26th of August, being able to use his limb tolerably well.

Case.

Another case of compound dislocation of the astragalus also occurred under the care of Mr. Henry Cline, for the particulars of which I am indebted to Mr. Green. The accident, as the former had been produced by the fall of a heavy stone. The foot was turned inwards; the anterior or navicular surface of the astragalus was exposed by an extensive opening; a wound on the inner side exhibited the articular surface of the os calcis for the astragalus. The reduction was made by placing the limb in the same position as for the reduction in the former case; then by extending the foot, and at the same time rotating it outwards.

The patient was a stout, middle-aged labouring man, of not very sober habits, and subject to gout. Extensive erysipelatous inflammation, which terminated in sloughing, and which gave rise to a great deal of constitutional irritation, retarded his recovery, which was, however, ultimately complete.

Mr. Green was likewise kind enough to furnish me with the following particulars of a case which was under his own care in St. Thomas's Hospital.

Thomas Toms, a bricklayer, aged twenty-three, was brought to the Hospital on the 14th of July, 1820; he had fallen from a scaffold at the height of three stories, and in his fall the foot had been caught between two of the spikes of an iron railing, and in this way he became suspended, with his head downwards. When admitted a large wound existed beneath the inner malleolus of the left leg, through which protruded the anterior articular surface of the astragalus, which had been separated from the navicular bone. The foot was inclined upwards and outwards; the tendons of the flexor muscles were tightly stretched; the posterior tibial artery had been torn through, and the accompanying nerve partially lacerated. Several attempts were made to re-place the dislocated bone, but without success, although the wound was enlarged with a scalpel. As I was at the Hospital, Mr. Green requested to see the case, and after a careful examination of the injured limb, I proposed the removal of the astragalus, as much preferable to amputating the limb. Mr. Green therefore carefully separated the ligamentous connection of the astragalus, and took it away; a ligature was put upon the posterior tibial artery. The natural position of the foot, &c. being then as near as possible restored, the

edges of the wound were brought together and supported by straps of adhesive plaister ; the limb was placed upon its outer side, on a well padded splint, having a foot piece ; the evaporating lotion was applied on the limb. For several days after the injury the patient suffered a good deal from febrile symptoms, and some occasional pain in the ankle ; but when the suppurative process was well established, about the seventh day, all these unpleasant symptoms subsided, and he proceeded very favourably until the end of July, when the formation of an abscess again gave rise to some constitutional derangement, which was relieved as soon as the matter was discharged. A second collection of matter which occurred about the end of August, again retarded his recovery, and he continued in an indifferent state until the 7th of September, with loss of appetite, and slight hectic ; the leg becoming slightly œdematous, but the discharge from the wound continuing copious. From that period he mended rapidly, but little occurring to retard his recovery, which was complete on the 25th of October. He left the Hospital on the 2nd of November, and has since resumed his business, without any inconvenience.

Dislocation
between
the tarsal
bones.

Another form of dislocation of the tarsal bones sometimes occurs from the falling of

heavy weights upon the foot; by which the five anterior tarsal bones, together with metatarsus and toes are displaced, the connections between the astragalus and navicular, and between the calcis and cuboid, being in a great measure destroyed.

A man was brought into Guy's Hospital, Case. in consequence of an injury to his foot, upon which a very heavy stone had slipped. The fore part of the foot was turned up, whilst the posterior part formed of the astragalus and os calcis remained in the natural state; it presented very much the appearance of a club foot. The reduction was effected by fixing the heel and leg, and extending the anterior part of the foot. In five weeks the man had regained perfect use of the limb.

For the particulars of the following interesting case of compound dislocation, I am indebted to Mr. South. The case was under the care of Mr. Henry Cline, in St. Thomas's Hospital.

Thomas Gilmore, aged forty-five, a stout Case. man, and in the habit of drinking freely, was admitted into the Hospital on the 28th of March, 1815, in consequence of an injury to his ankle, which had been occasioned by the falling of a very heavy stone upon his heel. On the fore and external part of the joint was a large wound, reaching from the middle of

the inferior extremity of the tibia to the external malleolus, and exposing the anterior articular surface of the astragalus, for the navicular bone, and also that for the os calcis on the outside; the tuberosity of the os calcis projected outwards, and the toes were directed inwards, towards the other foot. The natural position of the parts was restored by extending the foot and rotating it outwards. The edges of the wound were approximated, and retained in contact by the application of straps of adhesive plaister; the limb was placed in a fracture box upon the heel, and linen dipped in cold water was placed over the seat of injury, in consequence of some slight bleeding. During the following night he suffered much from spasms in the limb, and slept but little; but no urgent symptoms presented themselves. On the 30th, severe constitutional irritation had been set up; he was delirious, his pulse was very quick; his skin hot and dry, his mouth parched, and he had rigor. Some inflammation appeared about the wound. He continued in this state until the 2nd of April, with some extension of the inflammation up the leg; taking every six hours the fever mixture, with some antimonial wine. On the 2nd the severity of the constitutional symptoms had subsided, but he complained of pain in the wound, and

the limb exhibited an erysipelatous blush, with some œdema ; a small spot on the leg, which had been bruised, was ulcerated. He proceeded favourably until the 5th, when the constitution became seriously affected, but the symptoms indicated a state of debility, and the ulcer on the leg was in a sloughy state, although the original wound secreted a healthy pus. He was ordered the bark in decoction. Until the 10th, these unpleasant symptoms were present with little alteration, and the superficial inflammation of the limb extended nearly to the groin, and matter appeared to be forming in different parts ; he was allowed a pint of porter, and a grain of opium twice in the day. After this period, the inflammation gradually subsided, and the constitutional suffering became much lessened ; the quantity of porter was increased to two pints daily, and subsequently to three pints, on account of his weakness. Several superficial sloughs formed on the leg, which separated very slowly, not being got rid of until the 15th of May. His appetite and spirits varied considerably, but without any further serious drawback, he gradually recovered, and quitted the Hospital on the 12th of September, being then able to walk easily with the assistance of a stick.

Dislocation
of the in-
ternal cu-
neiform
bone.

I have seen two cases of dislocation of the internal cuneiform bone; the first was in a gentleman, who came to consult me a few weeks after the injury; and the second was in a patient at Guy's Hospital. Both presented the same characters; the bone projected inwards, and also a little upwards, being drawn up by the action of the tibialis anticus muscle.

In the first case, the dislocation was produced by a fall from a height; and in the second, by the fall of a horse, the foot being caught between the horse and the curb stone.

In neither instance was the bone replaced, but the displacement did not occasion any important lameness.

Treatment. I should recommend in the treatment of these accidents,—first, to confine the bone as much as possible in its natural position, by binding a roller around the foot, and to keep the bandage wet with an evaporating lotion, until the inflammation has subsided, and then to employ a leather strap, which can be buckled around the foot, so as firmly to confine the bone until the ligaments are reunited.

Of Dislocations of the Toes.

These dislocations are common either be- Scat of.
 tween the metacarpal bones and phalanges, or
 between the phalanges themselves. The same
 treatment should, in such cases, be adopted,
 as directed for similar injuries to the fingers.

I had a man under my care in Guy's Case.
 Hospital, who, in falling from a height,
 pitched upon the extremities of the toes, and
 had forced the first phalanges of the smaller
 toes, above the ends of the metatarsal bones,
 where they projected very much. Several
 months had elapsed after the receipt of the
 injury, which rendered all attempts to reduce
 the bones useless. The patient was after-
 wards obliged to wear a piece of cork hol-
 lowed at the bottom of the inner part of the
 foot, to prevent the pressure of the metatarsal
 bones upon the vessels and nerves.

Of Dislocations of the Lower Jaw.

The dislocation of the lower jaw may be Two forms of.
 either complete or 'partial; when complete,
 both of the condyles are thrown into the
 space between the zygomatic arch, and the
 surface of the temporal bone; but when

partial, one condyle only escapes, whilst the other remains in the articular cavity.

Of the Complete Dislocation.

Signs of.

When this accident occurs, the patient appears as if in a continued yawn, the mouth being widely open, without any power on the part of the patient to close it. Some trifling degree of motion often exists, so that the chin can be either elevated or depressed a very little. The chin is advanced, the cheeks are protruded by the coronoid processes, and a hollow is perceived immediately before the meatus auditorius, on account of the absence of the condyloid process from the glenoid cavity. The secretion of the parotid glands is increased, and dribbles over the chin, and the pain is at first severe.

Causes of.

The displacement may be occasioned by excessive yawning, by a blow upon the chin when the mouth is open, or by endeavouring to force any solid substance into the mouth, too large for the ordinary aperture. Mr. Fox, the dentist, informed me that he had known a dislocation of the jaw take place from spasmodic action of the muscles, when the mouth was widely opened to allow of the extraction of a tooth.

The reduction of the dislocation should, as in other cases, be effected as speedily as possible, in the mode which the following case will best explain.

I was called by Mr. Weston, of Shoreditch, Case. to visit with him a madman at Hoxton, who had had his jaw dislocated in an attempt to force some food into his mouth. Knowing that there would be great risk in employing the means usually recommended, I adopted the following plan:—I had the patient placed upon his back, with a pillow to receive his head, and in that situation he was firmly held; then having procured two forks, I wrapped a handkerchief round their points, and passed the handles into the patient's mouth, one on each side, behind the molares teeth, and whilst they were held in that situation, I forcibly drew the lower jaw towards the upper, by placing my hand under the chin; in this way, the reduction was easily accomplished.

I prefer, however, the use of corks, instead Treatment. of any more solid substance, which is likely to injure the gums; those employed for stopping the common quart bottles are of about the proper size, and should be placed one on each side of the mouth, behind the molares teeth, after which, the chin is to be raised in the manner already described.

Employ-
ment of a
lever.

A long piece of wood is sometimes employed in these cases as a lever, introducing it between the molares, first on one side, and then upon the other, and each time raising the extremity of the wood furthest from the mouth, so as to depress that part of the lower jaw beyond the molar teeth, and with it the condyloid process, when the action of the muscle will draw it into its articular cavity.

Another
mode.

Another mode which will generally succeed if the dislocation be recent, consists in placing the thumbs, which should be well covered, at the roots of the coronoid processes, and with them forcing that part of the jaw downwards and backwards, and at the time pressing the chin upwards.

Liability
to recur.

When once this dislocation has happened, the patient is very liable to a further displacement. After the reduction, a bandage should be applied, having four tails, two at each end, and a hole in the centre to receive the chin; of the tails, two are to be tyed over the head, and two behind the occiput; and the patient should not be allowed to masticate any solid food, until sufficient time has been allowed for the union of the lacerated parts.

Of the Partial Dislocation.

In this case, the condyloid process on only one side is displaced ; the mouth opened, but not so much as in the complete dislocations ; the chin is directed to the side opposite the injury, and thrown out of the axis of the face. Signs of.

This dislocation is usually produced by a blow on one side of the jaw when the mouth is open. Cause of.

The reduction may be accomplished either by the cork or the lever of wood. Reduction.

Of Subluxation of the Jaw.

The condyloid process of the lower jaw, is, as I have already described to condyles of the femur to be in the knee joint, sometimes displaced from the inter-articular cartilage of the joint, slipping before its edge ; fixing the jaw with the mouth slightly open. Signs of.

The efforts of the patient alone are usually sufficient to remedy the evil, but I have known it exist a length of time, and afterwards the motion of the jaw and power of closing the mouth return. Reduced by efforts of the patient.

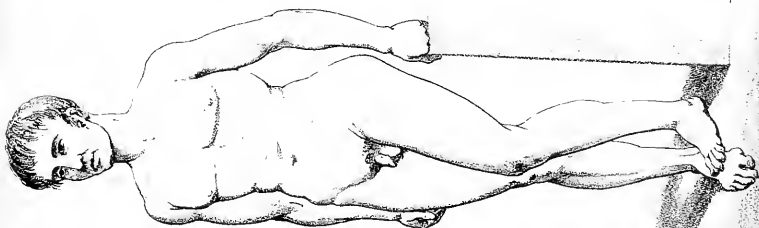
The displacement rarely happens but from extreme relaxation of the ligaments. Cause of.

Treatment. If called upon to relieve a patient under these circumstances, the force employed should be applied directly downwards, to separate the condyloid process from the temporal bone, and thus allow the cartilage to resume its proper situation.

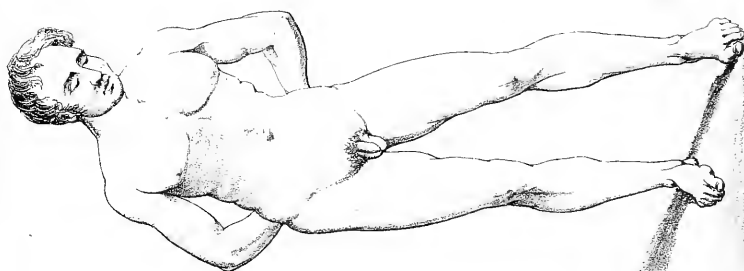
**Frequent
in young
women.**

I have most frequently seen this accident in young women, and have found such remedies as will invigorate the constitutional powers, as ammonia and steel, with the shower bath, most serviceable in subduing the tendency to its recurrence.

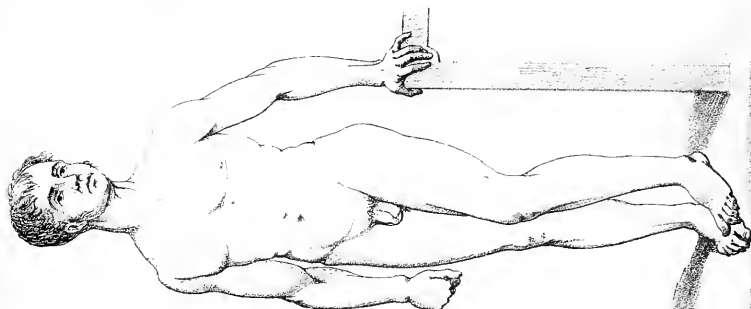
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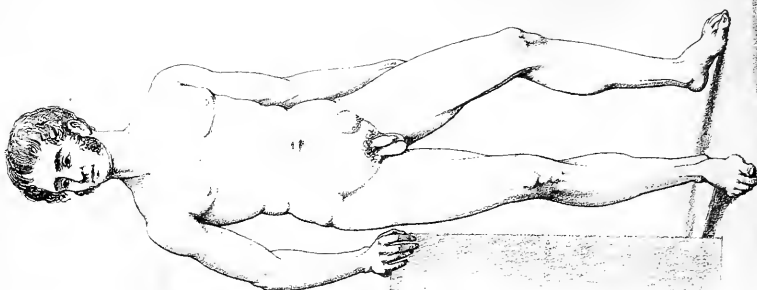
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III



IV



EXPLANATION OF THE PLATES.

PLATE I.

Shewing the Positions of the Limb in the different Dislocations of the Hip.

- Fig. 1. The dislocation upwards upon the dorsum ilii. The limb shortened—the hip projecting—the knee and foot turned inwards, with the toes resting over the metatarsus of the sound limb.
- Fig. 2. The dislocation downwards into the foramen ovale. The limb lengthened—the knee advanced and separated from the other—the toes pointed—the heel does not touch the ground—the body bent forward.
- Fig. 3. The dislocation into the ischiatic notch. The limb shortened—the knee and foot a little turned inwards, with the great toe resting against the ball of the great toe of the sound limb.
- Fig. 4. The dislocation on the pubes. Projection at Poupart's ligament from the head of the bone, the limb widely separated from the other, and the knee and foot turned outwards—the limb a little shortened.

PLATE II.

Shews the Mode of reducing the Dislocations of the Hip.

Fig. 5. The bandages and pullies applied to reduce the dislocation on the dorsum ilii.

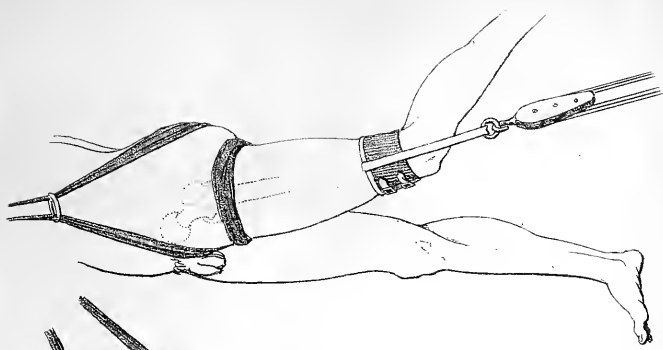
Fig. 6. The bandages and pullies applied to reduce the dislocation into the foramen ovale.

Fig. 7. The bandages and pullies applied to reduce the dislocation into the ischiatic notch.

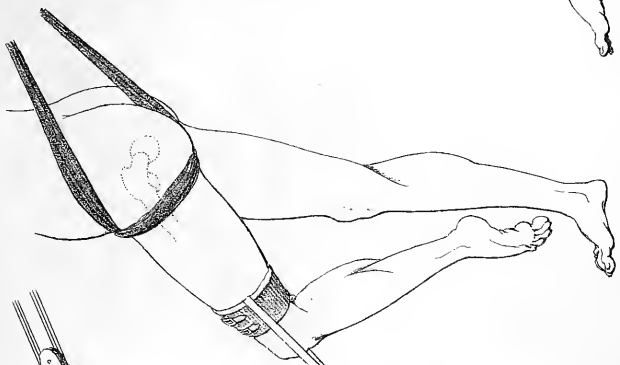
Fig. 8. The bandages and pullies applied to reduce the dislocation on the pubes.

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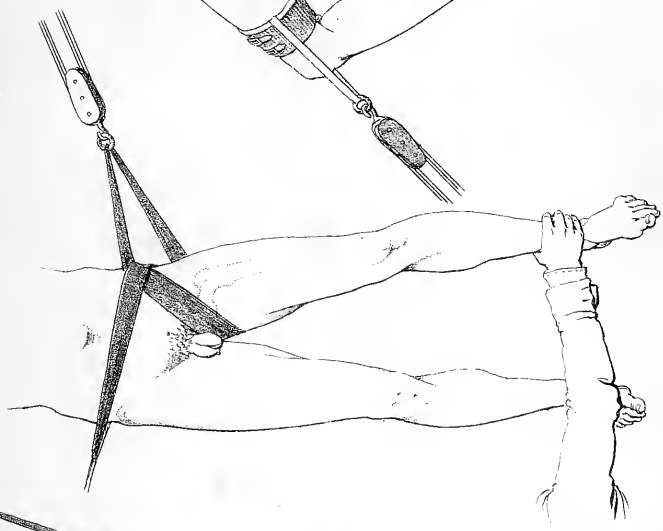
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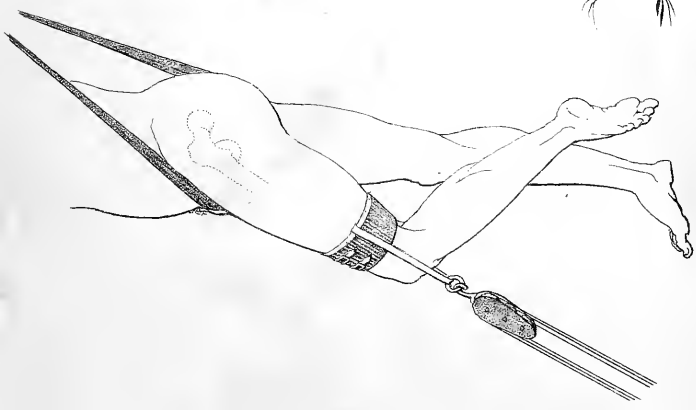
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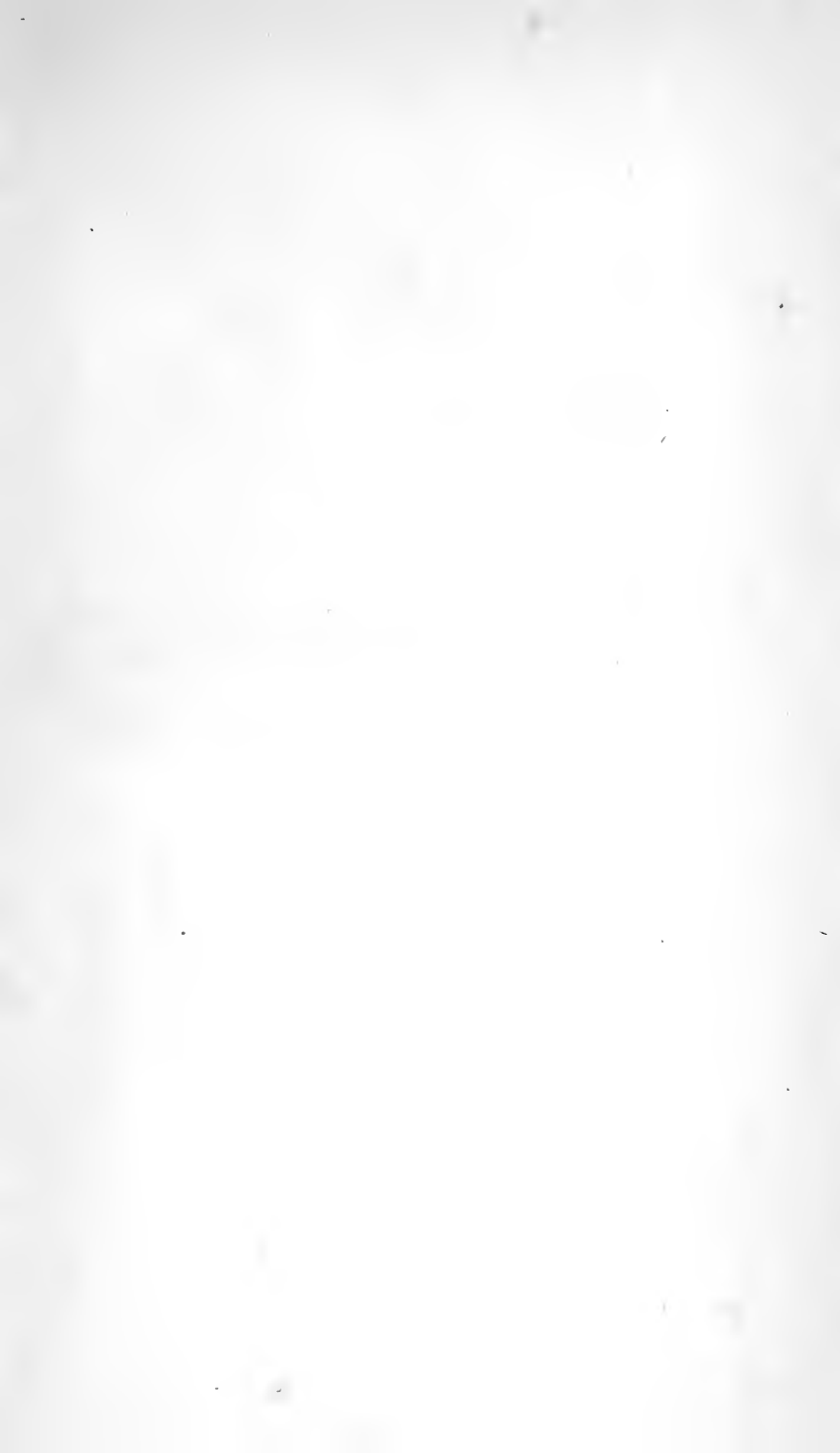
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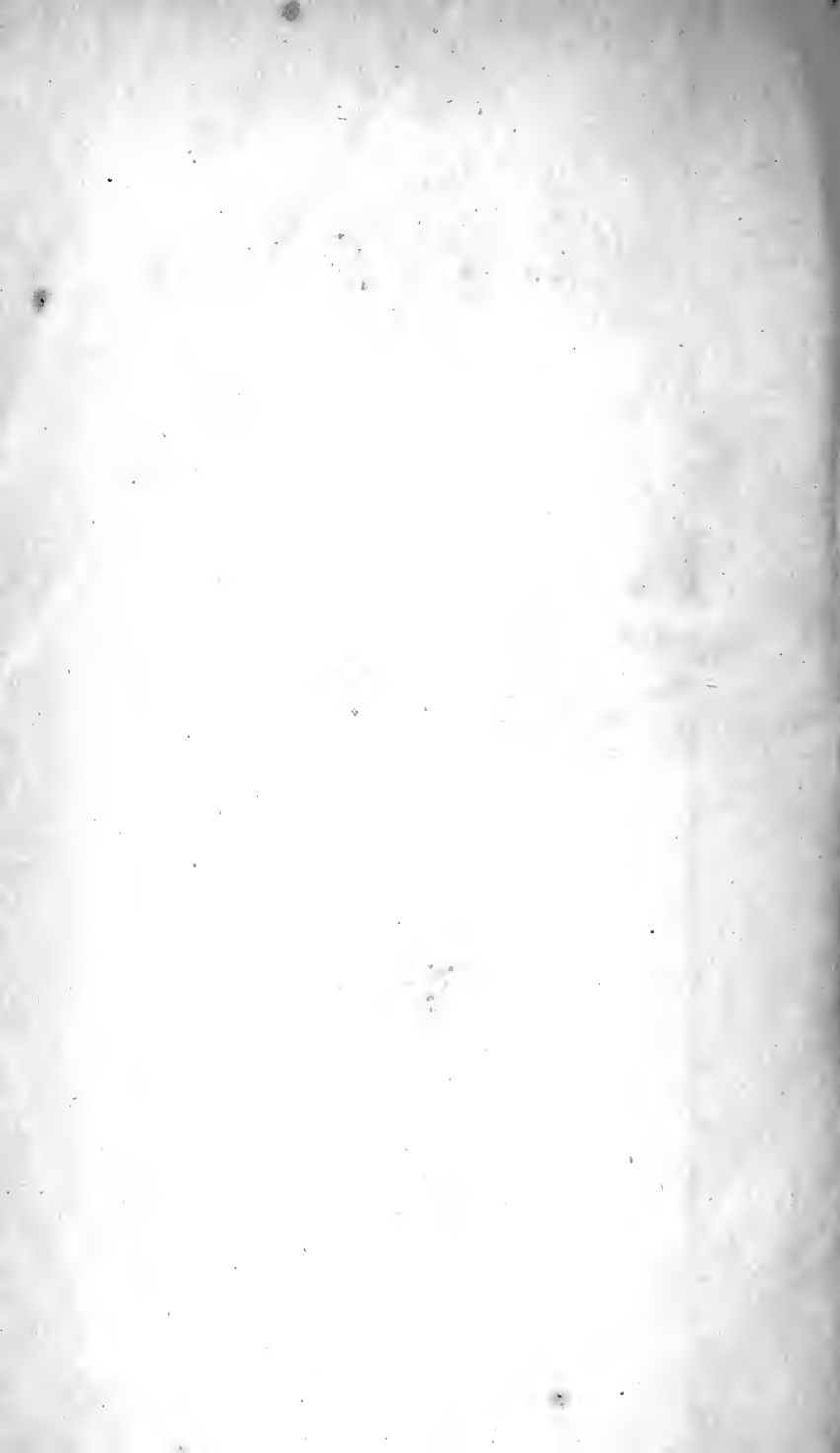


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